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No. VII

MENDELISM AND THE PROBLEM OF MENTAL DEFECT

I. A CRITICISM OF RECENT AMERICAN WORK

BY

DAVID HERON, D.Sc.

WITH FOUR DIAGRAMS

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MENDELISM AND THE PROBLEM OF MENTAL DEFECT: A CRITICISM OF RECENT AMERICAN WORK

1. A VERY grave responsibility rests at present upon those who have at heart the best interests of Eugenics and believe that there is a possibility in the future of the establishment of a real science of Eugenics which will exercise a marked influence on public opinion and ultimately on legislation. They see, unfortunately, dogma outstripping knowledge; they see fallacious methods of reasoning applied to problems which are essentially statistical by numerous writers who lack the necessary training; and they see wide acceptances of mere opinion where long years of trained and laborious research are needful in order to reach a basis of adequate knowledge.

Probably nothing during the course of the last twelve months has been more detrimental to the true progress of Eugenics as a science than the papers read and the statements made at the recent International Eugenics Congress. In some branches of knowledge little harm would be done by the statement of erroneous conclusions; no public opinion would be based upon them, and there would be no likelihood of social action resulting from them. But with Eugenics the matter is wholly otherwise; racial improvement and racial deterioration interest, and rightly interest, large masses of our citizens, who have no means of ascertaining whether a given statement is or is not a great scientific verity. They see it stated in the daily newspapers that Professor So-and-so, at what they take to be a great congress of specialists, has declared that degenerate stocks mend themselves by dying out; or they hear that Dr. Blank has discovered that insanity or mental deficiency obeys the laws of Mendel, and that the children of an insane parent, if normal themselves, may marry other normals without any detriment to their future offspring or the race. They do

not know that the Professor's statement may simply be based on an obvious fallacy in his statistical treatment, or that Dr. Blank within a year will have propounded a new theory, the very opposite of his earlier opinion! Views so expressed take root, and when the man in the street learns from actual contact with degeneracy that such statements are not true, then not only is the very name of Eugenics discredited, but the respect which all scientific opinion ought to carry is also destroyed. Long before this result is reached, Professor So-and-so and Dr. Blank will no doubt have propounded other hypotheses equally unsubstantiated and with an equal absence of any sense of social responsibility.

The task of the critic is always an ungracious and unthankful one; but if Eugenics is to become a recognized branch of science with that additional sense of social responsibility among its workers that must arise when we are discussing men and not mice, then the unpleasant must be undertaken without regard to the personal feelings which strong criticism inevitably excites. We would ask the reader to remember above all that these matters are not merely scientific controversies with purely philosophical bearing. Legislation with regard to the sources of racial degeneracy is certain to become more and more frequent in the near future; the idea of race betterment is not the monopoly of a few faddists and cranks; it is growing to have an almost religious significance with a large number of persons in this country, and the movement foreshadowed by the present Mental Deficiency Act is certain to grow apace whether or no it be backed by a scientific study of degeneracy. Shall there or shall there not be an accurate science of Eugenics on which we can base legislative action? Shall we be content with mere expressions of opinion, with slipshod data, and with inaccurate treatment of even such material? The only answer possible is that we cannot be satisfied with such a condition of affairs in the case of man. The service of man demands the very best that science can produce, and those of us who have the highest hopes for the new science of Eugenics in the future are not a little alarmed by many of the recent contributions to the subject which threaten to place Eugenics with the older 'social science' and much of modern sociology—entirely outside the pale of true science. Eugenics ought to be an accurate description at worst, a quantitative and exact appreciation at best, of the biological forces which control the evolution of national welfare.

We have no intention at present of entering into a general review

of the current literature of Eugenics. We propose to confine our criticisms to certain recent American work which has been welcomed in this country as of first-class importance, but the teaching of which we hold to be fallacious and indeed actually dangerous to social welfare. We have selected this rounded group of papers because they deal with a very pressing subject, that of mental defect, and in our opinion form an apt illustration of the points just referred to: i. e. careless presentation of data, inaccurate methods of analysis, irresponsible expression of conclusions, and rapid change of opinion.

Let us try to realize some of the points on which the science of National Eugenics has to advise the general public. What advice are we to give to the normal members of insane stocks with regard to their marriage? What advice are we to give to the State with regard to the epileptic or mentally defective? What shall we say to members of tuberculous and neurotic stocks who, urged by moral and racial considerations, not infrequently have doubts as to whether their cousins are suitable mates? Surely these are grave questions only to be answered with a grave sense of responsibility after adequate material has been collected and has been reduced by the most efficient processes available to modern science!

'At last it is possible', writes Dr. C. B. Davenport,[1] 'to give definite advice to those about to marry, or who do not wish to transmit their undesirable traits. . . . Weakness in any trait should marry strength in that trait and strength may marry weakness.'

It is absolutely necessary to nail such false coin to the counter, and to do this, it suffices to appeal to that Mendelian theory of which Dr. Davenport is such an ardent advocate. Most pathological 'weakness' is said to be recessive, most 'strength' to be dominant. Hence a 'strong' person is either a pure dominant (DD) or a hybrid with latent weakness (DR). The marriage of 'strength' and 'weakness' would thus lead either to all the children having the defect latent[2] or to 50 per cent. having the defect latent and 50 per cent. being actually 'weak'. Yet we are told that 'strength may marry weakness' although the penalty is that all the children will carry and 50 per cent. may actually show the defect! If 'strength's' whole racial duty be summed up in having *apparently* normal offspring who themselves or

[1] *Heredity and Eugenics* (University of Chicago Press, 1912), p. 288.

[2] In dealing with the inheritance of epilepsy and feeble-mindedness, however, Dr. Davenport states that the 'weakness' of the hybrid, instead of being merely latent, shows itself in 'an *intermediate* mental status' such as alcoholism, neurosis, chorea, paralysis, &c. (*Eugenics Record Office Bulletin* No. 4, pp. 4, 17, and 22.)

whose children will marry other *apparently* normal individuals and develop afresh the patent 'weakness', then we must indeed despair of Eugenic teaching. Haemophilia may lie latent for five generations, 'apparently normal' marrying normal, and then reappear to sweep off its victims.[1] This is not a theory but an actual experience, and a direct result of 'weakness' following Dr. Davenport's rule and marrying 'strength' and of 'strength' permitting itself to marry 'weakness'. We cannot conceive of a greater evil than that expressed in the teaching we have cited above.

This is only one illustration of many of a like nature. Dr. Davenport has started the theory that mental defect is a Mendelian recessive character, and has told us that 'when both parents are feeble-minded, all of the children will be so likewise; this conclusion has been tested again and again'[2]; and again, 'a defective married to a pure normal will have no defective offspring'.[3] If this conclusion were correct then once more, according to Dr. Davenport, 'strength might marry weakness', and instead of segregating the mentally defective, the State should endeavour to provide them with healthy mates! Even such an ardent Mendelian as Professor Bateson writes as follows on this point:[4] 'From such pedigrees as I have seen I should nevertheless hesitate to describe feeble-mindedness as a simple Mendelian recessive. It is possibly due to an absence of some factor or factors; but there is strong evidence that the normal result of a mating between normal and feeble-minded parents is a proportion of feeble-minded children, and it is difficult to suppose that most ostensibly normal persons are heterozygous in this respect.' Well may the Mendelians ask to be saved from their friends!

'We come now', writes Dr. Davenport, 'to consider mental peculiarities, and here at once enter a vast field in which surprising discoveries have been made in recent years, and which point to the cause of many of our social difficulties, *and the way out.*'[5] Again we cite Dr. Davenport's 'way out': 'Weakness in any trait should

[1] See, e. g., the pedigree of the Mampel family given in *The Treasury of Human Inheritance*, Vol. I, issued by the Galton Laboratory, pp. 267–71, and Plate XXXV, Fig. 389. This pedigree is quoted by Dr. Davenport in his *Heredity in Relation to Eugenics*, pp. 158–9.

[2] *Heredity and Eugenics*, p. 281. [3] *Ibid.*, p. 286.

[4] *Biological Fact and the Structure of Society* (Oxford, 1912), p. 13. Recently Bateson, in his *Address on Heredity* to the International Medical Congress (*B. M. Journal*, Aug. 16, 1913, p. 360), appears to go further: 'Lately also the American students of genetics have produced evidence *making it clear* that feeble-mindedness has at least one of the marked features of a recessive condition.' The italics are ours.

[5] *Heredity and Eugenics*, p. 280. The italics are ours.

marry strength in that trait and strength may marry weakness.' Even if Mendelism does apply to such a character as mental defect, the result of such advice is to extend the range of latency, to hide the evil behind an apparent normality of the offspring, and sooner or later the marriage of two such apparently normal individuals brings a recrudescence of the pathological condition. The birth of a deformed, mentally defective, or albinotic child to parents unconscious of any latent taint is one of the most painful of life's experiences as far as parentage is concerned, but the advice given by Dr. Davenport appears to us to lead directly to such results, and we have no hesitation in classing it as directly cacogenic; it is based on the dominance of a fashionable theory of the moment, and on the recedence of accurate investigation and knowledge. Such teaching must inevitably retard the whole development of Eugenics as an applied science and seriously damage its reputation.

The 'way out' thus indicated by Dr. Davenport is not an isolated instance of false doctrine. At the Eugenics Congress, Dr. Davenport is reported to have said:[1] 'As to the marriage of the insane, it seems doubtful if it is wise to refuse this without qualification. Two mentally normal persons who have each an insane parent are more apt to have insane offspring than an insane person who marries one in whom there is no taint of insanity. I think it might be unwise to deny to every person who has shown a tendency to manic-depressive insanity in its lighter forms marriage into mentally sound stock.'

Do these words, 'more apt to have insane offspring,' rest on any secure basis of properly analysed facts? We deny *in toto* that they do. They are really a verbalization of the two Mendelian formulae:

$$(\mathrm{DD}) \times (\mathrm{RR}) = 4\,(\mathrm{DR})$$
$$(\mathrm{DR}) \times (\mathrm{DR}) = (\mathrm{DD}) + 2\,(\mathrm{DR}) + (\mathrm{RR}).$$

The first assumes insanity to be recessive, and tells us that the mating of the normal and the insane will produce *no* insane offspring. This is contrary to an overwhelming amount of evidence which is only met by the arbitrary assertion that where such a mating has produced insane offspring, the normal parent must have carried latent insanity, whatever evidence against it the *available* pedigree may show. Since in the tenth generation backward every individual has, apart from marriages of kin, 1024 ancestors, and since possibly 3 or 4 per cent. of the community have some form of mental defect,

[1] *Problems in Eugenics*, published by the Eugenics Education Society, p. 154.

it is hopeless to attempt any denial of the statement, that when an insane child comes from one normal and one insane parent, the normal parent must have had somewhere an insane ancestor! For the rest we must leave to the individual parent to decide whether it is better that *all* his offspring should be tainted with latent insanity or that 25 per cent. should be normal, 50 per cent. tainted with latent insanity, and 25 per cent. actually insane. All such families are in our opinion eugenically inexpedient; all marriages of those of insane stock, whether themselves insane or carrying latent insanity, are highly undesirable. Above all, we repudiate in the name of Eugenics any sanction for the enfeeblement of strong stocks by mating them with weak stocks on the basis of a theory which, even if true, declares that all the offspring will carry latent defect. The strong should mate with strength. No test of normality before the event is possible, and the normal parent who marries the insane on the advice that 'strength may marry weakness' will only, if he has insane children, be told by these theorists: 'Ah, yes, but you must have had an insane ancestor somewhere.'

Nothing is more astonishing than the amount of approval that this cacogenic doctrine[1] has received in this country. Mr. Havelock Ellis writes:[2] 'These relationships of feeble-mindedness have been clearly brought out in an important investigation by Davenport and Weeks (*Journal of Nervous and Mental Disease*, November 1911), who have for the first time succeeded in obtaining a large number of really thorough and precise pedigrees of such cases.'

The morning papers at the time of the Eugenics Congress repeated broadcast similar statements: 'Dr. Davenport, Director of the American Eugenics Record Office, pointed out two years ago that two feeble-minded parents never have any but feeble-minded children' (*Daily Chronicle*, July 27, 1912); and we are further told in the same place of 'the entirely splendid work of the American Eugenics Record Office', where it is shown that 'the inheritance of epilepsy, when studied by the Mendelian method, can be stated exactly in terms of the Mendelian law'. It does, indeed, as we shall see, need to be studied 'by the Mendelian method'!

[1] Ellis and Punnett while not directly approving of the 'cacogenic doctrine' have expressed their approval of the work in this field of Davenport's Record Office.

[2] *The Task of Social Hygiene*, p. 36. On p. 198 Ellis writes: 'The pedigrees of the defective classes (especially the feebleminded and epileptic) are now being accurately worked out as by Godden [*sic*, Goddard], at Vineland, New Jersey, and Davenport in New York.'

'Precise knowledge', said Professor Punnett of Cambridge at the Eugenics Congress,[1] 'is at present available in man for relatively few characters; and those characters, such as eye-colour and certain somewhat rare deformities, are not the kind on which the Eugenist lays great stress. The one instance of Eugenic importance that could be brought under immediate control is that of feeble-mindedness. Speaking generally, the available evidence suggests that it is a case of simple Mendelian inheritance.' Professor Punnett admits 'occasional exceptions'. Here, again, we see that although the Balfour Professor does not give the evidence on which he bases this statement, he is yet fairly confident of the Mendelian nature of feeble-mindedness. He, too, probably, has accepted on faith and without criticism what the American investigators had proclaimed about feeble-mindedness. If he has, indeed, data of his own, then his opinion should have been supported by evidence, and he is doing a grave disservice to Eugenics by withholding it from publication.

A still more ardent Mendelian Eugenist stated at the York Congress of the Sanitary Institute[2] that: 'The only work upon man in the realms of hygiene which has yet been done is practically confined to the American Eugenics Record Office, to the results and methods of which I would specially draw the attention of the Congress. By strictly following the methods of Mendel, these workers have already obtained results as to the genetics of feeble-mindedness, epilepsy, and the "neuropathic taint" to which the highest importance must be attached.'

The writer of these sentences can hardly be aware of the extraordinary care, deliberation, and caution in statement which characterized the work of Mendel himself.

2. We have indicated how the rules laid down by Dr. Davenport have been accepted—without any adequate criticism—by a multitude of authorities in this country. They can hardly fail to weaken that sense of social responsibility which should be felt by every member of a 'weak' stock—again we repeat Dr. Davenport's words: 'Weakness should marry strength.' But there is another aspect of the question which this policy of rushing to conclusions and their wide public diffusion by popular congresses and books of the moment by men of the moment urge us to insist upon. In this country we all know that a measure for the better control of the mentally defective

[1] *Problems in Eugenics*, p. 137.

[2] *British Journal of Inebriety*, October, 1912, p. 64.

has just been passed into law. No such law can touch at present those who carry this defect in a latent form, but such persons can be reached by the teaching that holds that parenthood must be looked upon as a sacred trust. The theory of Mendel has been used as an argument for the segregation of the mentally defective, and only recently we were told that to attack the application of Mendelian laws to the phenomena of feeble-mindedness was to wreck the passage of the Mental Deficiency Bill. If any argument for that Bill be based on such slender considerations as the truth of Dr. Davenport's hypotheses, then the sooner the movement for the segregation of the feeble-minded is freed from such top-hamper, the less danger will there be of shipwreck.

Nor can we accept the view of Professor Punnett that a policy of strict segregation would *rapidly* bring about the elimination of feeble-mindedness.[1] In our opinion, after some study of the subject, there exists practically every grade of feeble-mindedness, and two feeble-minded parents far above the grade to which any segregation would apply may produce one or more children who would indubitably fall below the standard of intelligence needed to escape the application of even an English Mental Deficiency Act. All such an Act, when it has become law, can do will be to hinder the propagation of the *worst* types of feeble-mindedness, and so gradually raise the average intelligence of the whole community, which is not simply divided into two categories, the normal and the feeble-minded, each incapable of propagating any individuals unlike themselves. There will be no *rapid* elimination of the feeble-minded by segregation as Professor Punnett and other Mendelians assert; there will only be a continuous, desirable, but slow process of raising the national level of intelligence.

'Forget unessentials', writes Dr. Davenport, 'like skin-colour, and focus attention on socially important defects. Then by sterilization or segregation prevent the reproduction of the socially inadequate.'[2] As we have seen, segregation will be a slow and expensive process, and Dr. Davenport, as others, will then raise the question of sterilization. We hold that the time is far from ripe for such considerations except in those grave cases of sexual violence where the Swiss have, apparently with success, adopted this treatment. In America, however, the case is different; the initial steps have already been

[1] *Eugenics Congress*: *Problems in Eugenics*, p. 137.

[2] *Ibid.*, p. 155. The passage seems to indicate that Dr. Davenport is in favour of the mating of negro and white

taken, and it is an extension of the existing laws permitting sterilization that is being demanded. From a *Report of a Committee of the Eugenics Section of the American Breeders' Association*, presented to the recent Eugenics Congress,[1] it appears that in eight States 'there are laws authorizing or requiring sterilization of certain classes of defectives and degenerates', and although these laws are inoperative in all but two States (Indiana and California), 'there have been many more cases of sterilization of different types within institutions for purely medical or for a combination of medical and eugenic reasons, usually with the consent of the parents or guardians, without specific legislative authority, than have been performed under the statutes. Thus in some of the institutions of Pennsylvania, Kansas, Idaho, Virginia, and Massachusetts, none of which States has a sterilization law, there have been sterilized a considerable number of individuals.'

It is inevitable that those who advocate the segregation or sterilization of the mentally defective should quote in support of their propaganda the results of published investigations into the inheritance of mental defect. Thus the American Committee on Sterilization asks—the italics are ours: 'In an effective sterilization program, would it not be necessary that the unprotected females of the socially unfit classes *should be sterilized in relatively large numbers?* As a case in point, the following pedigree illustrates the manner of increase of defective children from defective women.'[2] The pedigree given is quoted from Drs. Davenport and Weeks's 'First Study of the Inheritance of Epilepsy' (*Eugenics Record Office Bulletin* No. 4, Fig. 3, p. 5, Case 829).

It seems to us that a very grave responsibility rests upon those who publish investigations on feeble-mindedness; they must be certain that no inadequate material is dealt with, that this material has not been collected with any *a priori* theoretical bias, that its discussion is both accurate and adequate, and that conclusions dogmatically stated one day will not be discarded on the next. Further, does not an equally grave responsibility rest upon those other sections of our community who, on the one hand, thoughtlessly reprint and repeat such conclusions or, on the other hand, commend them without applying any cautious criticism to the material on which they are based?

3. Attention has already been called to the part played by the

[1] *Eugenics Congress: Problems in Eugenics*, p. 460.

[2] *Ibid.*, p. 476.

recent Eugenics Congress in spreading broadcast such slipshod work, and an examination of certain papers read there showed that it was necessary to deal exhaustively with the whole work of the American Eugenics Record Office. In its Bulletins and Memoirs it is stated that 'established in connexion with the Eugenics Section of the American Breeders' Association in 1910, this office aims to fill the need of a clearing-house for data concerning "blood lines" and family traits in America. It is accumulating and studying records of physical and mental characteristics of human families to the end that people may be better advised as to fit and unfit marriages. It issues blank schedules (sent on application) for the use of those who wish to preserve a record of their family histories.

'The Eugenics Section and its Record Office are a development from the former committee on Eugenics, comprising well-known students of heredity and humanists; among others, Alexander Graham Bell, Washington, D.C.; Luther Burbank, Santa Rosa, Cal.; W. E. Castle, Harvard University; C. R. Henderson, University of Chicago; Adolf Meyer, Johns Hopkins University; J. Arthur Thomson, University of Aberdeen; H. J. Webber, Cornell University; Frederick A. Woods, Harvard Medical School.'

The Record Office appears to be carried on under the direction of Dr. C. B. Davenport, Director of the Station for Experimental Evolution, Carnegie Institution of Washington, and Secretary of the Eugenics Section of the American Breeders' Association. It has issued a series of Bulletins and Memoirs, and we shall now proceed to show that the material on which those papers are based has been collected with a decided bias in favour of a particular theory of heredity; that it is presented with extraordinary carelessness; that it is, on internal evidence, repeatedly contradictory; that it is not treated in any adequate statistical manner, and that the conclusions reached are not justified by the data. We shall further show that while opinions are expressed having grave bearing on social conduct, these opinions are light-heartedly changed from one publication to another.

Clear evidence as to the bias with which the data have been collected is afforded by a study of *Bulletins* Nos. 2 and 6 of the Eugenics Record Office. In *Bulletin* No. 2, 'The Study of Human Heredity: Methods of Collecting, Charting, and Analysing Data', by C. B. Davenport, H. H. Laughlin, D. F. Weeks, E. R. Johnstone, and H. H. Goddard, the methods 'in use at the Eugenics Record Office' are stated. On p. 7 *et seq.* we find the following:—

'*Limits to Pedigree.* How far among collaterals is it desirable to extend the pedigree? This depends on the nature of the primary trait.' . . . 'So many traits are inherited in accordance with the Mendelian rules that a brief statement of them is appended. But the field-worker is warned against being so prejudiced by these rules that her, or his, judgement is warped.' . . .

'Some defects that the field-worker will study, such as albinism and feeble-mindedness, are known (!) as recessive defects, i. e. they are defects due to the absence of the determiner making for normality in respect to these traits. Other defects, such as cataract and brachydactylism, are dominant defects, which means that they are due to the presence of some germinal determiner in addition to all the determiners for normality in respect to these characters.' . . .

'For example, by hypothesis, feeble-mindedness is for the most part a recessive trait,[1] and the hypothesis must be tested as follows: The field-worker finds a person suffering from feeble-mindedness, a descendant of two normal parents—by hypothesis both of these parents are *simplex*[2]; the field-worker must understand that each parent will probably have somewhere in his or her ancestry a feeble-minded person, *and it is the business of the field-worker to make a special search for such person or persons in the pedigree.*'[3]

It is difficult to understand how the field-workers would fail to be 'prejudiced by these (Mendelian) rules' when they are instructed 'to make a special search for the person or persons' who are considered necessary for the support of the Mendelian theory.

Bulletin No. 6 of the Eugenics Record Office, 'The Trait Book', by C. B. Davenport, gives further examples of this bias towards a particular theory of heredity. On p. 1 it is stated that 'in the study of human heredity it has first of all to be recognized that progress will be made only as traits are studied one at a time. The modern science of heredity, indeed, seeks as the element of study "the unit character".[4] . . . The need early arose for a list of traits that were to be indexed, and also, for the "field-workers", of a list of traits whose inheritance they were to study on the field.'

[1] Thus, on p. 8 we are told that feeble-mindedness is *known* as a recessive defect, and on p. 9 that 'by hypothesis' it 'is for the most part a recessive trait and the hypothesis must be tested'.

[2] This term is used by the authors as equivalent to heterozygous.

[3] The italics are ours.

[4] Professor Punnett has naïvely defined a unit character as 'one which exhibited Mendelian heredity'. (*Royal Society of Medicine*: *Epidemiological Section*, vol. i, Part I, p. 167).

Various directions are given for 'indexing' the traits; thus in dealing with blond pigmentation of the skin, the instruction is to 'record only when all of family, ff, fm, mf, mm, f and m and children are alike'. This will make sure, of course, that all the children of two 'blond' parents will themselves be 'blond', but it is of some interest to note that the rule is not always applied strictly by Dr. Davenport. Thus, in his 'Heredity in relation to Eugenics', also published in 1912, we find the following in his discussion of the inheritance of skin colour:—'When both parents are clearly blonds most, if not all, of their offspring are blonds. In 513 offspring reported as derived from this sort of mating 91·4 per cent. are recorded as blonds and 6·8 per cent. as intermediate, while only 1·8 per cent. are stated to be brunet —quite within the limit of error due to inaccuracy of the collaborators' (p. 36). Had the rule been strictly applied, these exceptional cases would not have appeared at all, and how much better would have been the demonstration of Mendelism!

Further, to a large number of traits is appended the instruction: 'Do not record the unaffected ancestors of an affected person. Field-workers and collaborators should extend pedigrees of this trait back along the "*direct line*" of ancestry as far as possible.' One of the characters to which this instruction applies is haemophilia, which usually descends *through the unaffected parent.* Thus in the Mampel family, quoted by Dr. Davenport from 'The Treasury of Human Inheritance', there are members with *five* generations of normal ancestors; *none of these ancestors would be entered if Dr. Davenport's instructions were carried out*, and thus there would have been no clue to the affected collaterals.

What faith are we to place in data collected in this way when we find that the field-workers are instructed 'to make a special search' for those individuals who are necessary for the support of the Mendelian theory, and when the data are 'indexed' in such a way that no exceptions to the Mendelian rules can appear? The pedigrees ought to be collected without bias of any kind, and every individual possible ought to be included, whether he fits in with the theory fashionable for the moment or not.

There are other features of 'The Trait Book' which deserve notice. Dr. Davenport says (p. 1) that 'the reports of the field-workers at the beginning of their work and for some time thereafter suffered from a paucity of vocabulary. Persons were returned as "smart", or "defective", or "feeble-minded", or "peculiar". In some cases no

further analysis was possible, but in most cases the vagueness of the terminology was due to an insufficiency of vocabulary and lack of appreciation of the possible content of the situation. This deficiency it is hoped the present booklet will help supply'. Dr. Davenport has certainly been successful in supplying a 'vocabulary'; some of the terms for which he makes himself responsible are: 'impracticalness', 'inadventuresomeness', 'disheartedness', 'unconversationableness'[1], 'unanecdoteness'. 'Jealousness vs. unjealousness' is given the index number 42625, but 'Jealousy vs. lack of jealousy' appears under the number 4842! Some of the other characters speak for themselves. We have 'ludicrousness vs. absence of sense of humor', 'sublimity vs. stolidity', 'sweetness vs. bitterness', 'coolness in emergency vs. loss of head', 'cooperativeness vs. aloofness'.

Dr. Davenport's views on disease are equally remarkable, for in the list of 'General Diseases', under the index-heading 'Rheumatism', appear with apparent sub-numbers such varied conditions as gout, diabetes insipidus, sea-sickness, and less certainly exophthalmic goitre, anaemia, alcoholism, and chronic occupational poisonings. Either the numbering is erroneous or it has no meaning.

4. The first of the publications of the Eugenic Record Office to require detailed analysis is *Bulletin* No. 4, 'A First Study of Inheritance in Epilepsy,' by C. B. Davenport and David F. Weeks. (Cold Spring Harbor, N. Y., Nov. 1911).[2] This paper deals with a series of pedigrees of inmates of the New Jersey State Village for Epileptics at Skillman, N. J., and the authors state (p. 1) that 'Epilepsy is employed in this paper in a wide sense to include not only cases of well-marked convulsions but also cases in which there has been only momentary loss of consciousness. Other, physically less marked, cases of epilepsy and various epileptiform and border-line cases have undoubtedly been frequently overlooked in the necessarily somewhat hurried investigations into the pedigree of patients'. The authors thus recognize epilepsy to be a continuously varying character, ranging through 'cases of well-marked convulsions' to 'only momentary loss of consciousness', and from 'physically less marked cases of epilepsy' to 'various epileptiform and border-line cases', and those who are not epileptic at all. Only the first two groups, however, are classed as epileptic, all the others being grouped together as normal;

[1] It appears in the index as 'unconservationableness'.

[2] It is reprinted from the *Journal of Nervous and Mental Disease*, vol. xxxviii, No. 11, pp. 641–70, 1911.

but the authors do not appear to have considered what the effect on their result would be if the 'less marked cases of epilepsy' were classed as epileptic and not as normal.

Further, the authors recognize a large number of cases of '*intermediate* mental status', such as alcoholism, chorea, apoplexy, migraine, paralysis, &c., while feeble-mindedness is regarded as equivalent to epilepsy. Their category of feeble-mindedness itself is very vague; according to Dr. Davenport,[1] 'this term (feeble-mindedness) is a lumber-room and comprises various mental deficiencies, such as inability to count, to repeat phrases, to learn to write or to draw, to meet difficult situations by intelligent adjustment, to control the appetites and passions, to appreciate moral ideas. Many persons who are not regarded as feeble-minded have some of these or similar defects, the typically feeble-minded are defective in several or many such mental traits. In what follows I shall use feeble-mindedness in the latter sense.' Thus those with *several* or *many* defects are, according to Dr. Davenport, to be sterilized or segregated; those with only *some* defects are to escape!

The theoretical assumptions on which the authors base their analysis of their data are best stated in their own words (p. 3):—

'In this paper our data have been analysed by the method commonly employed by biologists and known as the Mendelian method. This method assumes that the inheritance of any character is not from the parents, grandparents, &c., but from the germ-plasm out of which every fraternity and its parents and other relatives have arisen. The bodies of persons as we know them serve as (imperfect) indices of the nature of the germ-plasm from which they spring. The relation of soma and germ-plasm is as follows:

'1. If the soma lack a unit character upon which normal development depends, that is *prima facie* evidence that the representative of that character is absent from its germ-plasm; consequently such a person cannot transmit the character in question.

'2. If the soma has the unit character for normal development, that is evidence that the germ-plasm has the corresponding determiner. But either one of two cases is possible: (*a*) the determiner was derived from both sides of the house, so that it is double in the germ-plasm (duplex, designated below by 2) and all the germ-cells have the character; or else, (*b*) it came from one side of the house only, in which case it is single in the germ-plasm (simplex, designated below

[1] *Heredity and Eugenics*, p. 280.

by 1) and half of the germ-cells have and half lack the character. The condition in the case when the determiner is absent may be called nulliplex (designated below by 0).

'A moment's consideration will show that six kinds of matings, disregarding sex, are possible. These matings, together with the sort of offspring that they may be expected to yield, are indicated in the following table:

I. 0×0. All without the character of full mental development.
II. 0×1. 50% devoid of the character, 50% simplex.
III. 0×2. All with the character, simplex.
IV. 1×1. 25% with the character absent, 50% with it simplex, 25% with it duplex.
V. 1×2. 50% with character simplex, 50% with it duplex.
VI. 2×2. All with the character duplex—mentally strong.

'Practically, it is not always easy to distinguish the simplex from the duplex conditions,[1] although frequently the simplex condition is indicated by an *intermediate* mental status. We may, however, construct six main tables, subsequently dividing the second into two parts, according as closely as possible with the probabilities in respect to germinal composition of the parents.'

There are thus three gametic types of parents: RR = nulliplex, DR = simplex, and DD = duplex. The nulliplex include under epilepsy, 'cases of well-marked convulsions' and 'cases in which there has been only momentary loss of consciousness', under feeble-mindedness, those who are 'defective in several or many' mental traits, and cases of insanity.[2] The simplex include all cases of '*intermediate* mental status', i.e. the 'migrainous and neurotic, alcoholic, paralytic, sex-offending, choreic, suicidal, criminal', while those entered as normal, whether actually so or really 'physically less marked cases of epilepsy and various epileptiform and border-line cases', and persons with 'some' mental defect may apparently be either simplex or duplex. Drs. Davenport and Weeks's attempt to prove that epilepsy and feeble-mindedness follow Mendelian rules depends on the agreement between the proportions of normal and defective children of parents of different types and the theoretical expectation according to those rules. We propose to show that the authors' statements of the actual proportions of normal and defective children are not in agreement

[1] Well may the authors say that: 'practically it is not always easy to distinguish the simplex from the duplex conditions.' Personal equation would admit of the demonstration of any theory from such categories!

[2] Children of insane parents are, however, counted separately.

with their statements of the theoretical expectation that the actual proportions as given by them do not agree with the data in their own tables, and that the theoretical expectation is inaccurately stated. The data are given in Tables I–VII and are summed up on pp. 4–24. while the theoretical expectation is given on p. 2 (as quoted above). A preliminary difficulty arises from the fact that in Tables I–VII the classification of the various types of matings is based on the *somatic* character of the parents, which, in the case of normal individuals, is not sufficient to determine their gametic constitution, since they may be either simplex or duplex. The authors appear to hold that all the normal parents are really simplex, and hence no matings whatever of Types III, V, and VI appear!

The authors consider first of all the matings of a pair of nulliplex individuals, and state that there are twelve such matings with thirty-eight offspring whose mental condition is known, of whom sixteen are epileptic and twenty-two feeble-minded.[1] From this they conclude that 'when both parents are epileptic, both feeble-minded, or one epileptic and the other feeble-minded, all the offspring will be either epileptic or feeble-minded'. According to Table I, however, there were two *normal* children in Case 4062 b where the father was feeble-minded and the mother epileptic, so the authors' conclusion is not justified by their own data.[2] In this paper, published in November, 1911, the authors state that 'the rule that two feeble-minded parents have only offspring like themselves was apparently first noted by one of us in 1909'. This 'rule' has had a very short life, since it is, at any rate for a season, definitely abandoned in 'The Hill Folk' by Miss Danielson and Dr. C. B. Davenport (*Eugenics Record Office Memoir* No. 1, p. 11), published in August, 1912.

Matings of 'one feeble-minded or epileptic parent with one who is "insane"', although entered in Table I, are counted separately. The authors state that '3 matings yielded together 19 offspring, of which 15 grew up and are known, and of these 9 were normal, 1 epileptic, 4 feeble-minded, and 1 neurotic'. Table I gives only 2 such matings with 16 children, of whom 2 died early, 7 were normal, 1 epileptic, 4 feeble-minded, 1 migrainous, and 1 unchaste (none neurotic). The authors also state of Case 469

[1] Considering the looseness attached by the authors to 'feeble-mindedness' consisting in 'several' or 'many' but not 'some' traits, we might anticipate any results from a theory which starts not with a graded feeble-mindedness, but with a unit character summed up in the presence of 'several', but not in the presence of 'some' traits.

[2] The total should be 15 E, 20 F and 2 N.

(Fig. 10) that 'this mating yields 1 normal to 3 defective, in addition to others that are not known'. According to Table I,[1] however, there are 10 children,[2] of whom 2 died early, 4 were normal, 1 epileptic, 2 feeble-minded, and 1 unchaste.

The matings of nulliplex and simplex parents are divided into two groups: in Table II all the simplex fathers are alcoholic, while Table III gives all the other 'intermediate' forms of mental defect. Table II gives 8 cases in which the mother is feeble-minded, 11 in which she is epileptic, and 2 in which she is insane, but the authors deal only with the first group and find that of 38 children, 27 were epileptic or feeble-minded; according to their theory only 19 should have been defective. The authors endeavour to explain away the excess of defectives by stating that either 'some of the alcoholic fathers were also feeble-minded, while others had merely half of their germ-cells defective; or there is another possibility that we shall discuss more fully below'. On the first assumption, the authors are only prepared to accept their own classifications if the results are in agreement with their preconceived theories; while the second, that there is some poisoning of the germ-cells by alcohol, is dismissed later on the ground that the evidence is 'hardly crucial'.

The authors do not appear to be aware, however, that the restriction of the table to fraternities in which *at least one child is defective* must artificially create an excess of defectives. Even on the assumption that Mendelian rules apply to such cases, half of the families of 1, a quarter of the families of 2, and $(\frac{1}{2})^n$ of the families of n will contain *no* defective individuals[3] and will accordingly by the authors' method be left out altogether. Further, a family containing a large number of defectives is more likely to be met with and recorded than a family containing only a small number of defectives, and this also tends to increase artificially the number of defectives.

According to the authors, 'Table III comprises twelve fraternities containing epilepsy or feeble-mindedness in which one parent is feeble-minded or epileptic and in one case "insane", while the other shows some evidence of mental weakness, implied by the terms migrainous, choreic, neurotic, and paralytic (Figs. 17, 18, 19). These

[1] Here 'insanity' is reckoned as one of the 'nulliplex' group in the children, but apparently not in the parents, because in this case we should obviously not get the nulliplex × nulliplex giving only affected offspring.

[2] But the total is given as 9.

[3] n is the number of classified individuals in the fraternity.

fraternities comprise 86 offspring, of whom details are known concerning about 53. Of these, 22, or something under half, are normal, 15 (a little over a quarter) are epileptic, 3 feeble-minded, 9 neurotic, 2 alcoholic, and 2 sexually immoral. . . . Altogether, the result is about what is to be expected on the assumption that the tainted parent is simplex (i. e. has half his germ-cells without the factor for full mental development). The deficiency of normals is due to the fact that some of the simplex offspring are neurotic' (p. 14).

Now this quotation affords such an excellent example of the authors' methods that it deserves detailed consideration. There are in the first place *two* cases (Nos. 1365 and 2070) where a parent is 'insane', not one, as stated. According to the authors themselves, the result 'to be expected' is half defective, i. e. epileptic or feeble-minded, and half simplex, i. e. normal or of 'intermediate mental states'. There is no means of predicting how many of these ought to be normal. Actually we find that 18 out of 53 are defective, and since only fraternities with *at least* one defective are included the theoretical proportion should be considerably greater than a half. Nor is it easy to understand the authors' statement that 'the deficiency of normals is due to the fact that some of the simplex offspring are neurotic', since the authors invariably assume neurotic individuals to be simplex, and it is a deficiency of defectives, not of normals, that has to be explained.

The same error appears in Table IV, which, according to the authors, 'shows the results of the marriage of a normal and a defective. When the defective parent is feeble-minded, out of 17 known offspring 7 are normal; and when the defective parent is epileptic, out of 35 children[1] 16 are normal (Figs. 21, 22, 23). In each case the normals are slightly fewer than the expected 50 per cent., doubtless because some of the simplex offspring are neurotic.' According to the authors, however, all the 'intermediate' conditions, i. e. those who are neurotic, alcoholic, paralytic, &c., are assumed to be equivalent to each other, and to be simplex. They state further[2] that 'a moment's consideration will show that six kinds of matings, disregarding sex, are possible', and give the results to be expected from each mating. *In no case* do they state that the expectation is 50 per cent. of normals! If the normal parents in Table IV are regarded as simplex,[3] then the

[1] There are really 45!

[2] See p. 3.

[3] The authors assume that a normal individual is simplex, i. e. DR, if he has even one relative, however distant, who is defective, or alcoholic, or neurotic, &c. They have

expectation is '50 per cent. devoid of the character, 50 per cent. simplex'; i. e. 50 per cent. epileptic or feeble-minded, and 50 per cent. of 'intermediate mental status' or normal, but there is no means of determining how many ought to be normal and how many of 'intermediate mental status'. The proportion of normal individuals cannot therefore be used for testing the agreement with the Mendelian ratio. For this we must use the number of *defective* individuals and find that there are 24 out of 62 instead of the theoretical 31.[1] This is on the assumption that *all* the normal parents are simplex; if all are duplex, i. e. pure normal, then *not one* of the offspring should be defective.

Table V gives the 'mental condition of the children of parents, both of whom show some evidence of slight mental weakness', and cases of unchastity, hysteria, simple meningitis, apoplexy, paralysis, and alcoholism are all grouped together! The authors state that 'out of 186 classified offspring 82, or 44 per cent., are "normal"; about 30 per cent. are epileptic or imbecile, and the remainder insane (2 per cent.) and tainted'. Actually Table V gives 188 who are classified, 82 normal, 56 epileptic or feeble-minded, 3 insane, and 47 'tainted'; 59 are thus defective instead of the theoretical 25 % = 47.

It is stated that 'Table VI yields facts of importance concerning the progeny out of matings between the "tainted" and "normals" in which epilepsy occurs. There are 47 fraternities from such matings.' Table VI contains 47 matings, but in three cases there is no epilepsy among the offspring. Out of 187 classified offspring, 63 are defective, 27 tainted, and 97 normal. At most, assuming that *all* the normal parents are simplex, only 47 defective individuals are to be expected among the offspring (25 %) instead of the 63 actually found.

Table VII gives the 'mental condition of children of parents, both of whom are normal but have produced one or more epileptics'. In Case 3189 b, however, which is included in Table VII, there are no epileptic children. There are 115 classified offspring, of whom 26 are defectives, 8 tainted and 81 normal, but since it is impossible to determine whether the normal parents are simplex or duplex, it is not

forgotten that, according to their own theory, a normal individual may have *both* parents and *all* brothers and sisters, and grandparents, to say nothing of more distant relatives, alcoholic or neurotic, and yet be a pure normal, or, on the other hand, may have all these relatives *normal* and yet be simplex!

[1] One case in which all the children are normal occurs in Table IV.

possible to say what the theoretical expectation would be. The authors' assumption that any individual who has a defective or tainted relative is necessarily simplex is quite unjustifiable. A normal individual can be asserted to be simplex only when one parent is defective. Out of 119 normal parents in Tables IV, VI, and VII, only 7 can be definitely asserted to be simplex.

It is thus clear that the proportions of defective individuals given by the authors do not agree with the data given in the tables, that the theoretical expectation is frequently stated wrongly, and that there is no agreement between the actual proportions and those to be expected on the Mendelian hypothesis.

Not the least striking feature in Drs. Davenport and Weeks's work is the extraordinary number of contradictory statements that are made regarding the same individuals in their pedigrees. From the evidence afforded by this paper alone it is only possible to test a comparatively small number of the statements made—only those, in fact, which are in some form or other repeated. Thus, if it be stated in one place that three individuals 'died early', i. e. before the age of fourteen, and elsewhere in the same paper that the same three individuals married and had 3, 3, and 12 children respectively (Fig. 10, p. 9 and Table I, Case 469), it is clear that at least one of these statements is inaccurate. Similarly, if we find that four different versions are given of the mental condition of a family of twelve children (Fig. 16 and Tables II and V, Case 2487), it is obvious that at least three of these statements are inaccurate. On the other hand, if a statement is made only once, it is impossible to test whether it is likely to be true or not. We can thus only arrive at a *lower* limit to the number of blunders in this paper.

Thirty-three pedigrees are given in diagram form (Figs. 1–33), together with short descriptions of their principal features. On comparing the details given there with those given in Tables I–VII, and A, B, and D, we find that in *not a single case* do they agree. It is impossible to give in this paper an analysis of all these pedigrees, but the following four cases will indicate the nature of the blunders made, only the more striking being noted here.

Fig. 10. Case 469. Table I.

According to the pedigree, the father is alcoholic, while nothing is known about the mother. According to the description of the pedigree, the father 'is always quarrelsome and at times violent', while the

mother 'shows signs of epilepsy'. In Table I the father is said to be alcoholic and insane, the mother to be epileptic, and on p. 8 it is stated that 'the insanity of the father is probable'. According to the pedigree, this couple has 9 children, 1 F, I, and Sx, 1 E, 1 C, 1 N, and 5 of whom nothing is known.[1] Table I states that the total number of children is 9, but gives 10, of whom 2 'died early', 1 F and I, 1 F and C, 1 E, 1 Sx and C, and 4 N. According to the pedigree, the father had 5 siblings, 1 normal, 1 insane, and 3 whose mental condition was unknown; the latter married and had 3, 3, and 12 children respectively. According to Table I, however, these three siblings all 'died early', i. e. before the age of 14!

Fig. 16. Case 2487. Tables II and V.

The principal fraternity is one of 12 children. According to the pedigree, 1 is epileptic, 2 alcoholic, 3 normal, and of 6 nothing is known. The description of the pedigree states that 'of the ten children who survived, nothing is known about one. Of the other 9, 3 are normal, 3 neurotic, 2 alcoholic, and 1 epileptic'. Table II states that 2 'died early', 3 were normal, 5 were neurotic, 1 was insane, and 1 epileptic; while Table V states that 2 'died early', 3 were normal, 1 epileptic, 1 insane, 4 were neurotic (1 of these had spinal trouble), and 1 was alcoholic. Thus we have of those who 'died early', 0 or 2; of those of whom nothing is known, 0, 1, or 6; of the insane, 0 or 1; of the neurotic, 0, 3, 4, or 5; and of the alcoholic, 1 or 2; there are thus four different versions of the mental condition of these 12 children.

Fig. 19, Case 4369; and Fig. 20, Case 2013. Tables III and V.

These two pedigrees may be taken together, since they are linked up by marriage. In Fig. 19 there is a mating of a feeble-minded man with an epileptic woman. The description of the pedigree states that the man was a 'feeble-minded paralytic' and the woman epileptic. This mating ought, therefore, to have been entered in Table I. It does not appear there, but is entered in Table III as Case $\left.\begin{matrix}2015\\4369\end{matrix}\right\}$ b; but the father is now said to be paralytic but not feeble-minded, i. e. simplex instead of nulliplex. We have thus three different versions of the mental condition of the father! Of the 6 children, the pedigree gives

[1] F = feeble-minded; Sx = unchaste; E = epileptic; C = criminalistic; N = normal; I = insane; Ne = neurotic; P = paralytic.

4 feeble-minded (1 also criminal), 1 epileptic, and 1 unknown; Table III states that 3 died early, 2 were normal, and 1 epileptic. The 6 epileptic and 3 feeble-minded relatives entered in Table III do not appear to be blood relations at all. Matings of N × E in Fig. 19, and of A × I and A × N in Fig. 20, which ought to have been entered in Tables IV, II, and VI respectively, have been omitted.

Fig. 31. Case 2673. Table V.

According to the pedigree, the mental condition of the parents of the principal fraternity is unknown, although the father is said to be tuberculous. According to the description of the pedigree, the father is 'mentally normal but tubercular', while the mother is neurotic. If this description be accurate, this mating ought to have appeared in Table VI. It does not appear there, however, but in Table V as the mating of an alcoholic (but not tubercular) man and a neurotic woman. There were 8 children, and the pedigree states that 3 were unknown, 1 migrainous, 1 epileptic, and 3 normal. The description of the pedigree states that 'of the 8 children No. 1 died at seven years, No. 2 shows defective speech, No. 4 migraine, No. 7 St. Vitus's dance, and No. 8 is an epileptic at State Village. Three children are nervously strong' (*sic*). According to Table V, however, 1 died early, 3 were normal, 1 epileptic, 1 feeble-minded, 1 choreic, and 1 migrainous.

Further, certain information regarding the relatives of some of the normal parents of Tables IV, VI, and VII is given in Tables A, C, and D. In a large number of cases, however, the statements made in those tables are not in agreement with those made in other parts of the paper. Thus, Table A gives the mental condition of 13 of the normal parents of Table IV, and in 6 cases the statements made are contradicted elsewhere in the paper, while in another case the same facts appear under two different case-numbers. Thus, Case 4529 of Table IV appears to refer to the same family as Case 4521 of Table A; but the former gives 2 neurotic and 2 'criminalistic' relatives, the latter 4 neurotic relatives. In Table IV the normal parent of Case 380 has 1 neurotic and 8 paralytic relatives; in Table A, 8 are said to be neurotic and only 1 paralytic. In Cases 1395, 2207, and 1342, Tables IV and A agree, but differ from the pedigrees of those cases (Figs. 21, 22, and 24). Case 2124 of Table IV agrees with Case 2129 of Table A, but Case 2819 of Table IV differs from Case 2819 of Table A.

In Table C the mental condition of the relatives of 28 normal parents of Table VI is given. In seven cases the case-numbers differ in the two tables; thus, No. 335 of Table VI appears to be the same as No. 332 of Table C, 481 as 483, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$b as $\left.\begin{matrix}503\\3781\end{matrix}\right\}$b, 1705 as 1704, 1745 a as 1745, 3771 as 3772, 4371 as 4276. Table C is restricted to cases in which 'something is known about more than two relatives of the normal parent', but cases with fewer classified relatives are included if 'they have known defect'. The following seven cases which fulfil these conditions have been omitted from Table C:— Nos, 674, 167 a, 1132, 3624, 4589, 314 a, and 4552. The second column of Table C gives the sex of the tainted parent; out of 28 cases 1 is omitted, 2 are correct, and 25 are wrong. In 17 cases the statements made in Tables VI and C do not agree (apart from errors in case-numbers); these are Nos. 94, 1149, 1435, 346 a, 1451, 2375, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$b, 1705, 83, 971, 1044, 1745 a, 2193, 2892, 3274, 4371, and 4475 a. Thus, Case 1745 a of Table VI gives 10 relatives of the mother, 1 N, 1 A, 3 Ne, 4 F, and 1 choreic. Case 1745 of Table C also gives 10 relatives, but states that there are 2 N, 1 A, 3 Ne, and 4 F. Fig. 29, however, gives 10 F, 1 E, 1 I, and 4 A among the mother's relatives.

Table D gives the mental condition of the normal parents of Table VII; 33 cases are included, and of these 4 appear under wrong case-numbers, Case 1324 b appearing as 1324 in Table D, 2983 as 2984, 3189 b as 3182, and 4096 b as 4096. In 21 cases out of 33 Tables VI and D disagree; these cases are: 194 a (F), 914 (M), 936 (F and M), 1115 (M), 1324 b (M), 1356 (F), 1445 (F), 2232 (F), 2254 (M), 2583 (F), 2627 (F and M), 2983 (F and M), 3189 b (F), 3296 (M), 4096 b (M), 4113 (M), and 4413 (F and M), F and M showing whether father's or mother's relatives are concerned. Further, the relatives of the fathers of Cases 1261 a and 2269 in Table VII have been omitted from Table D.

Tables A, C, and D thus contain particulars regarding the relatives of 74 normal parents. In only 30 cases do the entries agree with the tables from which they are supposed to have been extracted, or with the pedigrees given in the paper. In 13 cases out of 74 the case-numbers do not agree, while 9 cases which ought to have appeared in Tables C and D have been omitted.

A large number of cases have been omitted altogether from the

tables. Thus, to take the first case, in No. 3031 of Table I, the father is said to be feeble-minded,[1] his parents are both normal, and of his 6 siblings, 2 died early, 2 were normal, and 2 were neurotic. We have thus an unrecorded mating of two normal parents with 7 children, of whom 2 died early, 2 were normal, 2 neurotic, and 1 feeble-minded.[1] This mating ought, therefore, to have been included in Table VII, but has been omitted. The following is a list of such unrecorded cases :—

Table I, Nos. 3031, 3165, and 2857 (F and M).

Table II, Nos. 1772 and 3515.

Table III, Nos. 4078, 473, 4326, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$ a, and 1174.

Table IV, Nos. 1395, 2124, and 380.

Table V, Nos. 514, 1852, 643 a, 1524, 2691, 1716, 2041, 1561 a, 3641, 3171, 1841, 1579, $\left.\begin{matrix}2013\\4369\end{matrix}\right\}$ a.

Table VI, Nos. 674, 167 a, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$ b, 1705, 971 (F and M), 1006, 94, 1745 a, and 1475 (F and M).

Table VII, Nos. 2232 and 4113.

Fig. 3—No. 829, Fig. 4—No. 3165, Fig. 7—No. 3052, Fig. 11—No. 1643, Fig. 14—No. 1319, Fig. 16—No. 2487, Fig. 17—No. 4078 (2 cases), Fig. 19—No. 4369, Fig. 20—No. 2013, Fig. 21—No. 1395, Fig. 23—No. 2819, Fig. 25—No. 1579, Fig. 26—No. 4286 (2 cases), Fig. 27—No. 2029, and Fig. 29—Case 1745 (2 cases).

Thus in all 58 fraternities, comprising over 300 individuals, have been omitted from the tables—a number which would be very largely increased were complete information published regarding the pedigrees. When it is remembered that in all only 181 fraternities appear in the tables, it will be realized that these omissions are very serious indeed, if any weight is to be given to the small numbers involved in the final ratios of each class.

A strong protest must also be made against the practice of including in the tables so large a proportion of individuals regarding whom nothing is known except the fact that they exist. Thus in Case 2029 in Table V, nothing is known about the mother's parents; she is said to have 3 siblings, but nothing is known about any of them, and of 86 'other relatives', nothing is known about 78. *Nothing whatever is known regarding more than half the individuals given in the tables.*

[1] Also 'not bright' and alcoholic.

181 fraternities are dealt with, yet in *only four* is the mental condition of both parents and grandparents known. 33 pedigrees are given in diagram form, and in not a single case has the mental condition of the parents and grandparents of a sibship been determined. These facts must have been obvious to any one who has even glanced at Drs. Davenport and Weeks's tables, and yet we find a writer in the *Daily Chronicle* (July 27, 1912) stating, in regard to the Eugenics Congress, that 'above all, for the foreign papers do not strike me, on the whole, as very weighty—we are to have some account of the entirely splendid work done by the American Eugenics Record Office in strictly applying the method of Mendel to man *and never studying less than three generations*[1]—our lack of attention to which essential has rendered worse than useless our reports on parental alcoholism and other subjects.'

5. Before commenting further on this work, we must deal with a paper read before the recent Eugenics Congress by Dr. Weeks on 'The Inheritance of Epilepsy',[2] since in his data are included the 177 pedigrees of the *Eugenics Record Office Bulletin* No. 4.

Dr. Weeks recognizes here again three classes of mental condition:—

(*a*) Those who are epileptic, feeble-minded, or insane, and are called nulliplex, 'defective', or 'neuropathic'. They are assumed to be pure recessive, RR,[3] for the calculation of Mendelian ratios.

(*b*) Those whose mental condition is said to be 'intermediate', principally the neurotic and alcoholic. They are termed simplex or tainted, and are assumed to be DR.

(*c*) Those who appear to be normal, and are either simplex (DR) or duplex (DD).

All the criticisms already made of Drs. Davenport and Weeks's classification of mental defect apply here also, but an even more extraordinary variety of conditions is classed as simplex; alcoholism, migraine, paralysis, shiftlessness, suicide, congenital syphilis, unchastity, and even neuralgia are all considered to be intermediate between epilepsy, feeble-mindedness, and insanity on the one hand and the normal condition on the other.

[1] The italics are ours. It is doubtful to whom the word 'our' applies in the last sentence. We should take it to be the editorial 'we', except for the appearance of 'me' a few lines above.

[2] Published in the official report of the Congress, *Problems in Eugenics*, p. 62 (Eugenics Education Society, London, 1912).

[3] In Table VI, however, a case of insanity is assumed to be DR and to be an 'intermediate' mental condition.

From these data Dr. Weeks states (p. 78) that 'it will be seen from the present evidence that epilepsy cannot be regarded as a Mendelian factor, when considered by itself, but that epilepsy and feeble-mindedness are Mendelian factors of the recessive type, in that their germ-cells lack the determiner for normality, or are nulliplex in character, while the tainted individuals, such as neurotics, criminals, sex-offenders, &c., are simplex, and the normals duplex or simplex in character'.

Now in testing whether the data support these conclusions it should be noted that, on Dr. Weeks's own hypothesis, a normal individual can be definitely asserted to be simplex only when one of his parents is defective and can *never* be definitely proved to be duplex. Matings of normals therefore involve special difficulties of which Dr. Weeks, like Dr. Davenport, seems entirely ignorant, but these will not be considered here[1]; it will be sufficient to deal with the matings involving defective and tainted individuals.

Summaries of the various tables are given by Dr. Weeks in the text, but they are so inaccurate that it has been found necessary to reject them altogether and to use the data as given in the tables. On p. 72, for instance, it is stated in giving the results of Table III that 'there were 25 matings with 161 conceptions. Sixty died before 14 years of age, 24 are too young for classification, leaving 77 for study. Of these 27, or 35 per cent., are epileptic; 9, or 11 per cent., feeble-minded; 24 show some slight nervous or mental weakness, and 17 are normal'. On referring to Table III, however, we find that there are 65, not 60, who died before 14; 21, not 24, who are too young for classification; leaving 75, not 77, for study. Of these 26, not 27, are epileptic; 9 are feeble-minded; 24 'show some slight nervous or mental weakness'; and 16, not 17, are normal. Only two items are given correctly, probably by accident. In testing the possibility of applying Mendelian rules to Dr. Weeks's data, we have therefore been compelled to take the data as given in the tables and not as summarized in the text, although, of course, the tables themselves may have little relation to the actual facts. Further, since simplex normals cannot be distinguished from duplex normals except in a very few cases, we have grouped normal and tainted individuals together with the following results:—

[1] It may be confidently stated that for testing Mendelian theory no value whatever can be laid on Dr. Weeks's results for normal × normal matings.

Matings.	Table.	Result.	Mental Condition of Children.		
			Defective.	Tainted and Normal.	Total.
E or F × E or F	I	Actual	102	10	112
		Theoretical	112	0	112
E or F × I	I a	Actual	7	15	22
		Theoretical	22	0	22
E or F × A	II	Actual	79	47	126
		Theoretical	63	63	126
I × A	II a	Actual	10	4	14
		Theoretical	7	7	14
E or F × Tainted except A	III	Actual	35	40	75
		Theoretical	$37\frac{1}{2}$	$37\frac{1}{2}$	75
I × Tainted except A	III a	Actual	9	17	26
		Theoretical	13	13	26
Tainted × Tainted	V	Actual	118	218	336
		Theoretical	84	252	336

E = Epileptic. F = Feeble-minded. I = Insane. A = Alcoholic.

The theoretical values given are those of Dr. Weeks, and it is on the basis of these results that he concludes that 'epilepsy and feeble-mindedness are Mendelian factors of the recessive type'. Tables I and I a, giving cases where both parents are defective, furnish the crucial tests, and we see that in Table I, there are 10 exceptions out of 112 cases, and in Table I a, 15 exceptions out of 22 cases, when, according to theory, *all* the children should be defective. How does Dr. Weeks account for these exceptions? He says that of the first ten, 'eight who came from parents who developed epilepsy late in life were tainted' and two were 'drunkards who may or may not have been feeble-minded'. In not a single case, however, does Dr. Weeks give the age at which epilepsy developed in the parents; nothing would have been said about the age of incidence at all had it not been necessary to get rid of some exceptions to his theory, and it would be rather interesting to know what, according to Dr. Weeks, is the gametic constitution of a person who develops epilepsy late in life. Equal weight must be given to his statement that the other two exceptional cases who are alcoholic when they ought to be feeble-minded, 'may or may not have been feeble-minded'. Mendelism 'may or may not' apply to mental defect, but this hardly proves that it does. Of the 15 exceptions to the rule in Table I a, 7 are normal and 8 'tainted'. Dr. Weeks endeavours to explain away the normal

individuals by stating that 'in one case the father's insanity seemed to be traumatic and in the other alcoholic', but has forgotten that even then some explanation is required for the presence of the 8 'tainted' offspring involving three additional matings.

Dr. Weeks finds Table II equally unsatisfactory, since the proportion of defectives is much too high. 'We have, however, 61 per cent.[1] nulliplex, 39 per cent. simplex—the increase over the expectation[2] being probably due to the fact that the alcoholic parent was also mentally defective, or that the alcoholism may, through the poisoning of the germ-cells, be a contributing cause of epilepsy'. If it be a 'fact' that the alcoholic parent is 'also mentally defective', then these matings ought to have appeared in Table I and not in Table II, and in that case the 37·3 per cent. of *simplex* offspring would require to be explained away since *all* the offspring of such matings ought to be defective; if, on the other hand, Dr. Weeks is unable to say whether these alcoholic parents are mentally defective or not, then his data are useless for testing *any* theory of heredity. These explanations are, however, based upon a misapprehension, which is shared by Dr. Davenport, and arises from an inadequate acquaintance with Mendelian theory. Every sibship in Table II contains *at least one defective individual*, and, as we have already seen, on the author's own hypothesis, one-half of the families of one, one-quarter of the families of two, &c., ought to contain *no* defectives, and these cases have been omitted. Further, a family containing a large number of defectives is more likely to be recorded than a family containing a small number of defectives. The number of defectives is thus artificially increased, and this must be taken into account when determining the theoretical expectation. Instead, therefore, of explaining away an excess of defectives, Dr. Weeks ought to explain why there are too few. Will he suggest that this is probably due to the fact that the alcoholic parents were also the *more intelligent* or that the alcoholism may, through its action on the germ-cells, tend to *prevent* mental defect?

The correction to be applied to Table V is considerably greater, since three-fourths of the families of one, nine-sixteenths of the families of two, &c., have been omitted.

The analysis of material selected in this way presents many difficult problems of which Drs. Davenport and Weeks seem entirely ignorant, but these difficulties do not apply to Tables I and I a, which conclu-

[1] Table II gives 79 nulliplex out of 126, a percentage of 62·7, not 61.

[2] 50 per cent. of each.

sively prove that, so far as the present data are concerned, Mendelian rules do *not* apply to mental defect.

In this paper there is an even lower standard of accuracy than in Drs. Davenport and Weeks's joint paper. Nineteen pedigrees are given in diagram form, and only two agree with the statements made in the various tables. The most serious differences occur in dealing with case No. 1745, Fig. 16. The original diagram was so badly designed that it has been found necessary to redraw it for reproduction here (Fig. iii, facing p. 35). In the tables there are five fraternities bearing the case number 1745: in Table I, 1745 a and 1745 b; in Table II, 1745 d; and in Table VI, 1745 a and 1745 b. No explanation is given of the duplication of the numbers in Tables I and VI. Case 1745 a in Table I has 11 children—3 unknown, 1 epileptic, 6 feeble-minded, and 1 neurotic. There is no mating with 11 children in the pedigree, but this mating may refer to III. 11 and 12 who have 9 children—1 unknown, 1 epileptic, 6 feeble-minded, and 1 alcoholic (not neurotic). If this be so then the number of mother's siblings is also wrongly stated—the pedigree giving 2 unknown, 1 normal, and 2 alcoholic, while Table I gives only 4, 1 died before 14, 1 normal, 1 neurotic, and 1 feeble-minded. One of these feeble-minded children is the father in Case 1745 b of Table I (IV. 11 in the pedigree). Table I gives 10 father's siblings instead of the 8 shown in the pedigree, while the neurotic individual of the previous mating is now said to be alcoholic. The woman marked IV. 19 in the pedigree is entered there as of unknown mental condition, in the description of the pedigree as 'of uncertain mentality' and by entering this mating in Table VI it is implied that she is mentally normal. She is the sister of the mother of Case 1745 b of Table VI, and there her mental condition is said to be unknown. Her father is marked alcoholic, but not feeble-minded in the pedigree, described as a worthless drunkard, and entered in Table VI as feeble-minded and alcoholic. The pedigree gives 4 siblings of her husband, IV. 45; Table VI gives only 3.

In this pedigree there are no fewer than five fraternities which have not been entered in any of the Tables. These are the children of: III. 16 and 17 (F × A with 5 children, of whom 1 is alcoholic and 1 a 'vicious loafer'); of III. 18 and 19 (A × chorea, with 7 children, of whom 1 A, 1 Ne, and 1 N or unknown); of III. 29 and 30 (A × F with 3 children, 1 F, 1 P, and 1 unknown); of III. 37 and 38 (P × A with 5 children, of whom 1 is alcoholic); and of IV. 7 and 8 (N × A with 4 children, 2 N, 1 F, and 1 unknown).

The complete list of omissions is a large one. In Case 3054, Table I, for instance, the paternal grandparents are both said to be feeble-minded. They have 7 children, of whom 1 is unknown and 6 feeble-minded. This mating ought therefore to have been entered in Table I, but has been omitted.[1]

Altogether we find that eighty-eight matings have not been entered in any of the tables, a number which would no doubt have been very largely increased had all the pedigrees been published.

In a number of cases it is impossible to say whether the grandparental matings have been omitted or entered incorrectly. Thus the maternal grandparents in Case XXX a of Table I are said to be A and F respectively and to have one child who is epileptic. This case ought therefore to be entered in Table II, but the Case XXX which is entered in Table II, although a mating of A × F, has 7 children, of whom 2 are epileptic and 1 neurotic. Similar difficulties arise in Table I, Case XII; Table I a, Case 1872; Table II, Cases 3912, 597 d, 597 c and 1745 d; Table II a, Case 4197; Table III, Cases 3692 and 2784; Table IV, Cases 5114, 597 b, and 4326 b; Table V, Case 4192 a; Table VI, Cases 3146, 1006, and 1561 b; and Table VII, Cases 1574 a and 3189 b.

The mating of the paternal grandparents of Case 4197 of Table II a, both of whom are said to be migrainous, ought to appear in Table V; no mating of this number occurs, but one, Case 4192 a, agrees in many respects with the information given in Table II a. If Cases 4197 and 4192 a refer to different pedigrees, then the mating of the paternal grandparents of the former ought to be added to the list of omissions. Similar difficulties occur in Cases 1364 e of Table IV, 1367 a of Table

[1] The following is a list of such omissions :—

Table I, Nos. 3054, 3037, IX a, 3162, 5412, and 2857 (2).

Table II, Nos. 1772, XXX, and XXVII.

Table II a, Nos. 3515 and 4197.

Table III, Nos. 4078, $\left.\begin{matrix}4369\\2016\end{matrix}\right\}$ b, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$ a, 2784, 5537, 473, 4652, 4326, and 2309.

Table III a, No. 2167.

Table IV, Nos. 1392, 2124, and 4137.

Table IV a, No. 380.

Table V, Nos. 1841, 3921, 2029, 1852, 643 a, 5159, 976 (2), 1524, 2691, 1716, 2041, 1561 a, 3641, 3171, 402 a, $\left.\begin{matrix}2016\\4369\end{matrix}\right\}$ a, XXXIII, 3825, 4192 b, and 4025.

Table VI, Nos. 2315, 1506, 1203, 1073, 354, 4925 (2), 4213, 674, 167 a, $\left.\begin{matrix}504\\3781\end{matrix}\right\}$ b, 1705, 1475 (2), 2234, 5667, 4243, 413, 4702, XXVI, 1561, 94, XIII.

Table VII, 176, 3204, 145 a, 975, 4113, and 2701.

From the pedigrees we find that 12 matings have been omitted : 1 each from Figs. 2, 13, 14, 15, 17 ; 2 from Fig. 19, and 5 from Fig. 16.

IV, and 1365 of Table III a, and in Cases 1579 of Table V, 1574 b of Table II, and 1574 a of Table VII.

Certain information regarding the relatives of the normal parents of Tables IV, IVa, VI, and VII, is given in Tables A, B, and C. In dealing with Tables IV and A, Dr. Weeks states that 'from a study of Table A, it is evident that 20 of the normal parents had ancestors who showed some mental or nervous weakness'.[1] Table A, however, deals with 'the defective and tainted relatives' of the normal parents and need not include any ancestors at all. Thus the normal parent of Case 2819, Fig. 14, is said to have 2 epileptic and 5 neurotic relatives; according to the pedigree she had an epileptic sister, an epileptic niece, and 5 alcoholic (not neurotic) cousins. The term 'ancestor' can hardly be applied to sister, niece, or cousin.

Table A contains 24 entries; one of these, 1872 c, ought not to have been included since there are no classified relatives, and of the remaining 23, 10 are not in agreement with the Tables IV and IVa from which they were taken, and one, 2337, is wrongly numbered; 3 cases have been omitted, and there are 4 cases, not 3 as stated, with no defective relatives. Further, 6 cases are taken from Table IVa, not from Table IV as stated; they ought not to appear in Table A at all.

In dealing with Table VI, Dr. Weeks states that 'at least 74 of these reported normal parents (see page 98, Table B) have been found by the field-workers to have tainted heredity, so that these matings are of the type simplex × simplex, and the findings would seem to indicate that the matings are all of this type'.[2] Table B, however, contains 72, not 74, entries, and in 7 cases the relatives show no defect whatever. In 31 cases the information given in Table B differs from that given in Table VI, while 24 cases which ought to have been entered in Table B have been omitted. In certain other cases it is only possible to say that *some* blunder has been made. Thus there appears in Table B a case, No. 35, with 4 classified relatives—2 insane, 1 neurotic, and 1 alcoholic. No case of this number occurs in Table VI, but the normal parent of Case XXXV has 7 classified relatives—3 insane, 1 epileptic, 2 alcoholic, and 1 paralytic. If Nos. 35 and XXXV are not intended to refer to the same case then Case XXXV has been omitted from Table B. A case, Case XIV, occurs in Table B, although there is no case of this number in Table VI. Two cases bearing the number XIII appear in Table B—one of them may

[1] *Problems in Eugenics*, p. 73 (Eugenics Education Society, 1912). [2] *Ibid.*, p. 76.

be intended for Case VIII of Table VI. Cases 198, 1149, XIV, and 483 of Table B do not appear in Table VI; they may be intended for Cases 1982, 1147, XXVI, and 481 of Table VI, although only in the first case do Tables VI and B agree.

Table C classifies the relatives, not the 'ancestors' as stated, of the normal parents of Table VII. The following cases in Table C do not appear in Table VII: 87 (twice), 27, 1716, 1324, 2984 (twice), and 3189. They probably correspond to Nos. 874, 273, 1716 a, 1824 b, 2983, and 3189 b of Table VII, but in some cases the statements made in the two tables are not in agreement. There are also 29 other cases in which Tables VII and C differ, while 34 cases which ought to appear in Table C have been omitted.

These tables, A, B, and C—full of blunders, as we have indicated—are, like Tables A, C, and D of Drs. Davenport and Weeks's joint paper, intended to prove that the normal parents of Tables IV, VI, and VII are really simplex since most of them have tainted relatives, but this is based on an entire misconception of Mendelian theory. The fact that a normal individual has one or more tainted relatives is no proof whatever that he is simplex, since, as has already been shown, a man's parents, grandparents, and siblings may *all* be tainted, and yet the man himself be pure normal. Tables VIII and IX, which give the mental condition of parents who are alcoholic and migrainous respectively, show the same extraordinary blunders. There are 13 types of mating, and only 4 agree with Tables II–VI.

A further test of the accuracy of the work of Drs. Davenport and Weeks can be obtained by comparing the two papers we have just dealt with. Drs. Davenport and Weeks's *Eugenics Record Office Bulletin* No. 4 is dated November, 1911, and Dr. Weeks's paper at the Eugenics Congress was read in July, 1912, only eight months later, and in the introductory paragraph he says: 'I have endeavoured to bring our study to date and have therefore borrowed from, and will include in this paper, the 177 pedigrees studied by Dr. Davenport and the writer in our joint paper.'

Of the pedigrees given in diagram form, 11 appear in both papers; in 5 cases, however, they appear under different numbers. Thus, Case 3669 of the *Eugenics Record Office Bulletin* appears as Case 3667 at the Eugenics Congress, 584 as 586, 829 as 825, 3165 as 3162, and 2013 as 2016. No pedigree appears in the same form in the two papers, but the differences are most serious in case No. 1745 (Fig. 29 of the *Bulletin* and Fig. 16 at the Congress). Unfortunately these

Fig. (ii). Pedigree 1745 as given by Davenport and Weeks in the Eugenics Record Office Bulletin No. 4. (Properly draughted), 1911.

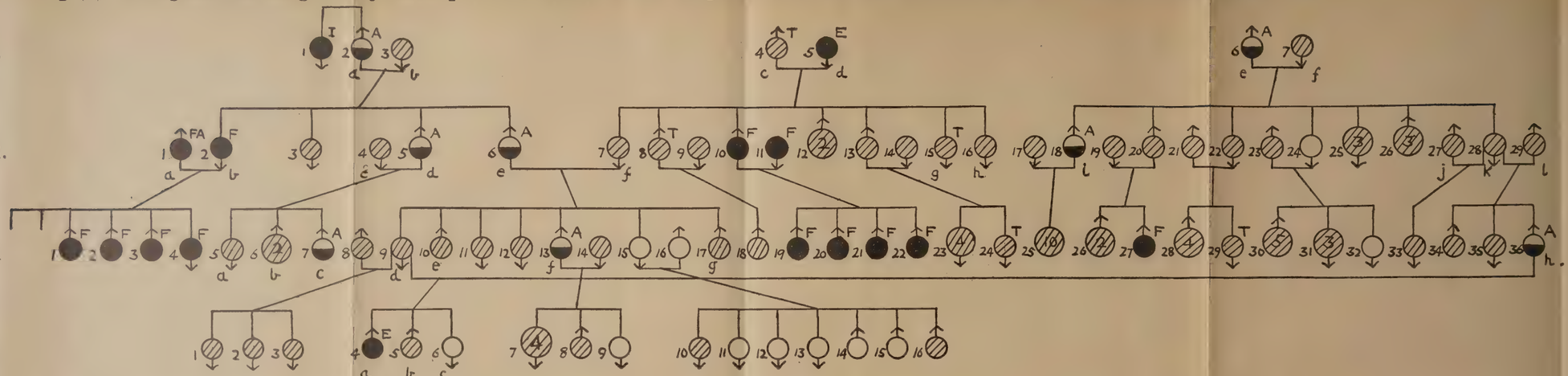


Fig. (iii). Pedigree 1745 as given by Weeks at the Eugenics Congress. (Properly draughted), 1912.

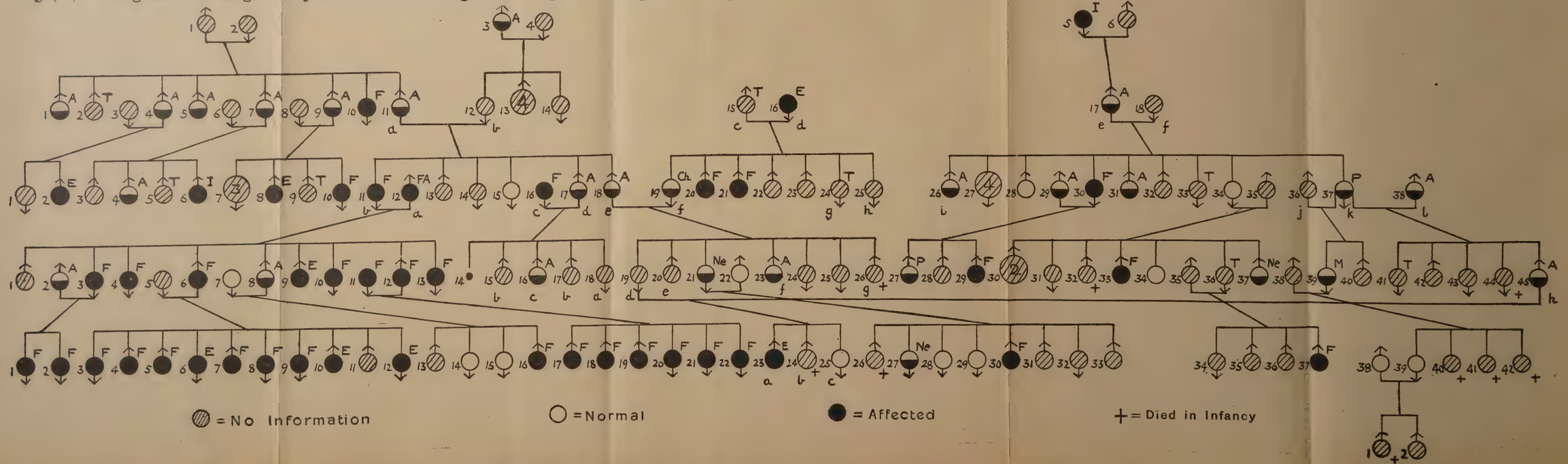
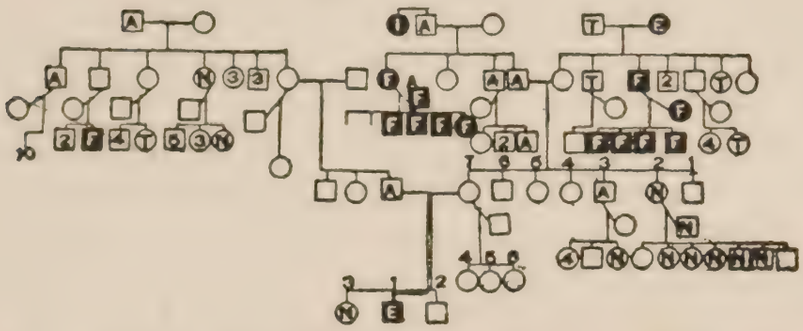


Fig. (i). Facsimile of Pedigree 1745 as given by Davenport and Weeks.



'FIG. 29. This chart illustrates many principles. The central mating is that of a normal × alcholic with one of the children normal; the other defective. There are in one branch of this family two F × F mating with eight feeble-minded children and none normal; and in the midst of this branch of the family (lower, right) is an N × N mating with five normal offspring and one (the eldest) neurotic. Case 1745.'

pedigrees have been so badly designed, and in the case of the *Bulletin* so badly drawn, that it is practically impossible to analyse them as they stand. An exact reproduction of this pedigree from the *Bulletin* is given above with the authors' description of it; it will suffice to show how difficult it is in the absence of an index number to each individual and with the authors' extraordinary method of mixing up the different generations to refer to any individual in the pedigree; indeed the words 'lower, right' are all the help the authors give in locating a mating. The pedigrees have therefore been redrawn [1] and are given in Figs. (ii) and (iii).[2]

An examination of these two pedigrees, published within an interval of eight months, shows that there are comparatively few individuals of whom we can say with certainty that they appear in both pedigrees. In order that they may be more easily recognized a small letter has been placed under the number; thus IV. 9 of the *Bulletin* and IV. 19 of the Eugenics Congress are each marked with a 'd'. The description of Case 1745 in the *Bulletin* states that 'the central mating is that of a normal × alcoholic', but in the pedigree the woman is left blank to indicate that nothing is known about her.

[1] I have to thank Miss H. Gertrude Jones for undertaking this troublesome piece of work.

[2] The following is the description of this pedigree by Dr. Weeks:—'The central mating is that of a woman of uncertain mentality, who died of cancer (her mother suffered from chorea, her father is a worthless drunkard), married to a man who for many years was a hard drinker and then became an ardent member of the church. They had three children, the first an epileptic, the second died in infancy, the third is apparently normal.'

The Eugenics Congress paper states that 'the central mating is that of a woman of uncertain mentality . . . married to a man who for many years was a hard drinker . . .' In the pedigree she is again left blank, but in Table VI it is assumed that she is mentally normal. According to the *Bulletin*, 'there are in one branch of this family two F × F matings with eight feeble-minded children and none normal. Only one of these matings appears in the tables. The first of these matings, III. 1 and 2, appears to correspond to the mating of III. 11 and 12 in the Eugenics Congress paper, the mother in both cases being an aunt of the woman of the 'central mating'. Instead of the four feeble-minded children shown in the *Bulletin*, there are in the Eugenics Congress pedigree 9 children, while in the tables the number is said to be 11. Instead of the children being all feeble-minded, one is now alcoholic, an 'intermediate' mental condition according to the authors. The second F × F mating of the *Bulletin*, III. 10 and 11, does not appear in the Eugenics Congress paper at all.

According to the *Bulletin* there is 'an N × N mating with five normal children and one (the eldest) neurotic'. The mother (IV. 15) is a sister of the woman of the central mating, but on turning to the Eugenics Congress paper we find that no sibling of this woman is marked normal, and that the only one who married is neurotic. A second marriage of the woman of the 'central mating' given in the *Bulletin*, is omitted in the Eugenics Congress paper. The husband of this woman has an equally varied career in those eight months, and the list of differences could be extended almost indefinitely. It is difficult to realize that the same family is being considered.

The like standard of accuracy is shown in the tables. The results of comparing the versions of the 177 pedigrees, involving 181 fraternities, common to the two papers may be given in tabular form thus:—

Table.	Total Fraternities.	Cases omitted.	Cases entered under wrong numbers.	Cases where statements differ in the two papers.
I	14	1	6	9
II	21	—	2	10
III	12	—	1	10
IV	24	1	4	16
V	39	—	2	24
VI	47	4	1	13
VII	24	1	—	14
Total	181	7	16	96

Further, Tables A, C, and D of the *Bulletin* contain 74 entries, and we can find only 69 of these in the Eugenics Congress paper, 8 of them under different case numbers. Of the 69, 39 have different versions of the facts in the two papers.

It will, we think, be clear that no legitimate conclusions whatever can be drawn from data collected under these vague categories which admit of any amount of personal equation, and which are then tabled in this slipshod manner. We may safely say that no proof of Mendelism applying or not applying to mental defect can be deduced from such work, and the manner in which these memoirs have been accepted as valid contributions to science by responsible Mendelians and Eugenist publicists in this country is not only disastrous for Eugenics, but does grave harm to Mendelian theory itself. We know no more about the heredity of feeble-mindedness and epilepsy than we did before—we know only the central fact that these defects are certainly hereditary ; and considering the haste and carelessness with which these pedigrees have been collected and published, we very much doubt whether this central fact has received any solid basis of additional demonstration.

6. Besides the papers just discussed in which insanity is dealt with incidentally in relation to epilepsy and feeble-mindedness, a further American paper professes to deal with insanity directedly. It is entitled 'A Study of Heredity of Insanity in the Light of the Mendelian Theory', by A. J. Rosanoff, M.D., and Florence I. Orr, B.S., and forms No. 5 of the *Bulletins of the Eugenics Record Office*.[1] *Bulletin* No. 3, a 'Preliminary Report of a Study of Heredity in Insanity in the Light of the Mendelian Laws', by Gertrude L. Cannon, A.M., and A. J. Rosanoff, M.D., deals with 12 pedigrees which are said to be included in the data of the later study. One is, however, missing, Chart No. VI, Case 455 ; curiously enough this pedigree is selected by Dr. Davenport as an illustration of the inheritance of insanity in *Heredity and Eugenics*, p. 283. Dr. Davenport says that 'from the studies of Dr. Rosanoff and his collaborators, it appears that if both parents be subject to manic depressive insanity or to dementia precox, all the children will be neuropathic also (Fig. 95)'. Dr. Davenport's description of the pedigree (Fig. 95) on p. 284 reveals neither 'manic depressive insanity' nor 'dementia precox'—nor indeed insanity of any kind among the

[1] It is reprinted from the *American Journal of Insanity*, vol. lxviii, no. 2, pp. 221–61, 1911.

parents, for he states that it is the 'Pedigree of a family in which the father's parents (upper left) are both nervous (N) and have four nervous children. The mother is nervous'. There are thus two matings where both parents were merely 'nervous'. This pedigree is dropped by Dr. Rosanoff in his second study, but we are not prepared to dissent from the view that the citation of a pedigree by Dr. Davenport is a disqualification for its further use.

The use of the term 'insanity' in the titles of these two papers is very misleading; only a comparatively small proportion of the affected individuals are actually insane. These papers deal, not with the inheritance of insanity, but with the inheritance of what the authors call a 'neuropathic' condition which is so comprehensive that it is a matter of surprise that there are any 'normal' individuals at all; it is, indeed, a fortunate circumstance that the Mendelian theory requires the presence of *some* normal individuals. The 'neuropathic' condition is based upon appearances and conditions manifested from infancy to old age, and the following are some of the conditions which, in the authors' opinion, justify classification as neuropathic:—'died in infancy of convulsions ("inward spasms"),' 'senile deterioration,' 'died of marasmus, had one convulsion,' 'sister of mercy in Australia, is said to have died of home-sickness,' 'quick tempered,' 'very queer, lives alone, boards out cats,' 'restless,' 'fidgety, cannot keep still,' 'nervous, especially when he has a cold or a headache,' 'sick headaches,' 'worrier,' 'rambler,' 'neuralgia,' 'insomnia, neuralgia,' 'dictatorial, abnormally selfish,' 'not very bright,' 'high strung, cries easily,' 'odd, very quiet disposition,' 'seems to have lost interest in life; when interviewed would say only "I know nothing more than sister told you,"' 'nervous, flighty,' 'talks about things she knows nothing of.' These are some of the conditions dealt with in these studies of the inheritance of *insanity*, and it is on the basis of such classifications that Dr. Davenport gives advice regarding the marriage of the *insane*.

Further, on p. 225, the authors state: 'In selecting cases our aim has been to exclude all those forms of insanity in the causation of which exogenous factors, such as traumata, alcoholism, and syphilis, are known to play an essential part;' but we find that individuals described in the following terms are classified as neuropathic: 'alcoholic, died from acute alcoholism,' 'periodic drinker,' 'very alcoholic,' 'alcoholic.' Thus in a study of the inheritance of insanity, insanity caused by alcoholism is to be excluded, but alcoholism causing

death or having no effect that has been noted at all—is to be included.

The authors' general conclusions are as follows (p. 228) :—

'*It would seem, then, that the fact of the hereditary transmission of the neuropathic constitution as a recessive trait, in accordance with the Mendelian theory, may be regarded as definitely established*, and (p. 259) :—

'1. The neuropathic constitution is transmitted from generation to generation in the manner of a trait which is, in the Mendelian sense, recessive to the normal condition. Rules of theoretical expectation are accordingly as follows :

'*a.* Both parents being neuropathic, all children will be neuropathic.

'*b.* One parent being normal, but with the neuropathic taint from one grandparent, and the other parent being neuropathic, half the children will be neuropathic and half will be normal but capable of transmitting the neuropathic make-up to their progeny.

'*c.* One parent being normal and of pure normal ancestry, and the other parent being neuropathic, all the children will be normal but capable of transmitting the neuropathic make-up to their progeny.

'*d.* Both parents being normal, but each with the neuropathic taint from one grandparent, one-fourth of the children will be normal and not capable of transmitting the neuropathic make-up to their progeny, one-half will be normal but capable of transmitting the neuropathic make-up, and the remaining one-fourth will be neuropathic.

'*e.* Both parents being normal, one of pure normal ancestry and the other with the neuropathic taint from one grandparent, all the children will be normal, half of them will be capable and half not capable of transmitting the neuropathic make-up to their progeny.

'*f.* Both parents being normal and of pure normal ancestry, all the children will be normal and not capable of transmitting the neuropathic make-up to their progeny.'

It will be noticed that although the paper is entitled 'A Study of Heredity of Insanity', the term 'insanity' does not occur in the conclusions at all.

The data on which the above conclusions are based are given by the authors on p. 227 of their paper and are here reproduced :—

Types of mating.	Number of matings.	Total number of offspring.	Died in childhood.	Data unascertained.	Neuropathic offspring.		Normal offspring.	
					Actual findings.	Theoretical expectation.	Actual findings.	Theoretical expectation.
a. RR × RR = RR	17	75	11	0	54	64	10	0
b. DR × RR = DR + RR	37	216	46	1	84	84½	85	84½
b_1. ,, ,,	56	284	20	4	106	130	154	130
c. DD × RR = DR	14	61	13	3	0	0	45	45
d. DR × DR = DD + 2DR + RR	7	34	5	0	8	7¼	21	21¾
d_1. ,, ,,	55	335	39	3	99	73¼	194	219¾
e. DD × DR = DD + DR	20	92	12	3	0	0	77	77
f. DD × DD = DD	0	0	0	0	0	0	0	0
Totals	206	1097	146	14	351	359	586	578

These conclusions may now be considered *seriatim*. It is clear from the authors' own data that all the children of two neuropathic parents are *not* neuropathic, there being 10 normal children out of 64, so that conclusion 1. *a* (see p. 39) is not justified by their own statements. The authors endeavour to explain away these ten exceptions by stating that in two cases (aged 38 and 29) 'the neuropathic constitution is not positively excluded', and that the remaining eight cases (aged 8–22) 'have not reached the age of incidence'. We have already seen that the neuropathic constitution ranges from infantile convulsions to senile deterioration; what, then, is the 'age of incidence'? In the next line of the table, 85 normal individuals are entered. We might naturally suppose that the age of each would be carefully stated, and that all those under the age of 38 would at least be excluded—*but in not a single case is the age given.* The eight children aged 8–22 are all said to be 'normal children without progeny', and of those 85 normal individuals 40 are said to be 'normal children without progeny'. How many of these 'have not yet reached the age of incidence'? According to the authors 11 children who 'died in childhood' are to be excluded from consideration; yet 8 children who died in infancy are included in the total of 54 neuropathic offspring. But why not exclude every normal from the whole of the table? It is clearly impossible to outlive the possibility of senile deterioration'. Every individual is either 'insane'—or might become 'insane' if only he lived long enough.

Conclusion 1.*b* (see p. 39), that from a mating of neuropathic and simplex

half the children will be neuropathic and half simplex must also be rejected. 37 matings are included in this group, and the authors state that in every case the simplex condition of the normal parent was 'definitely ascertained', and in paragraph 1. *b* it was stated that one parent was 'normal but with the neuropathic taint from one grandparent'. Actually, however, there are only 16 cases out of the 37 in which the 'neuropathic' taint has been definitely ascertained, and the other 21 cases ought to have been included in Group b_1, not in Group *b*. The blunder arises from the assumption made by the authors that every normal individual with a neuropathic sibling is necessarily simplex, an assumption which is directly at variance with the authors' conclusion 1. *d*, where duplex and neuropathic children are asserted to be equally frequent when the parents are both simplex. Further, the 85 normal individuals entered in this group include 40 'normal subjects with progeny, many of whom have not yet reached the 'age of incidence', and ought therefore to have been excluded, and it is noteworthy that in these 37 fraternities there is not a single case in which *all* the children are normal although this is to be expected in every second family of one, in every fourth family of two, &c.

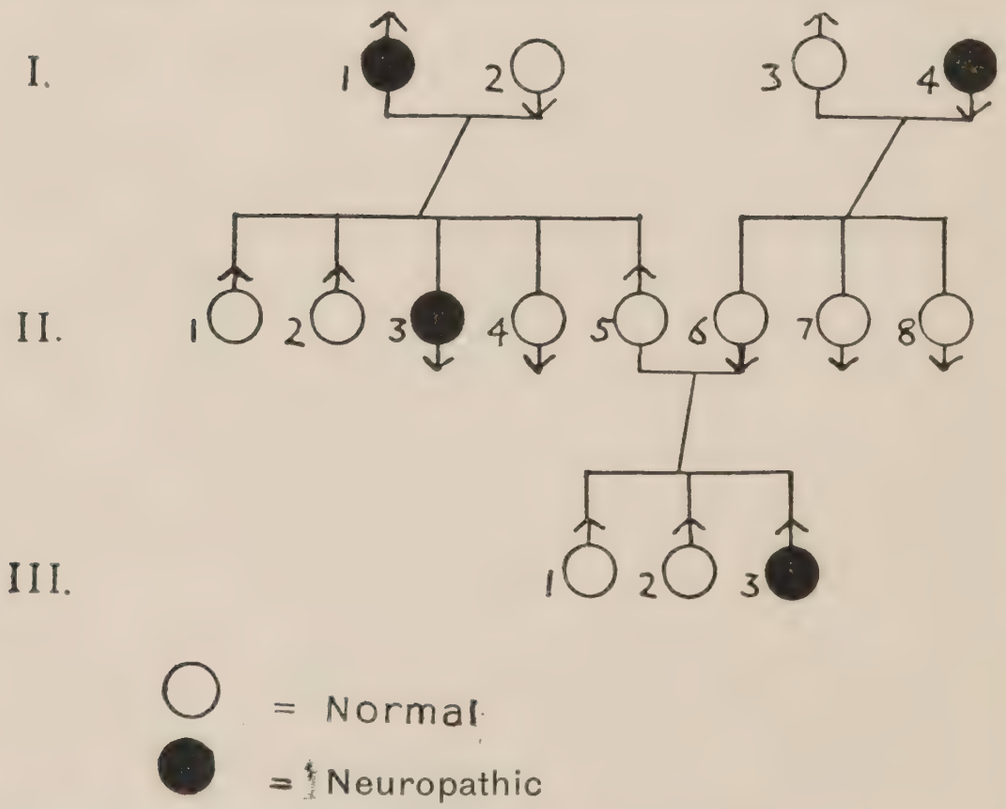
Most serious of all, however, is the statement that none of the children from the mating of neuropathic and 'pure' normal are neuropathic. Group *c* contains 14 cases in which it is alleged that one of the parents is 'normal and of pure normal ancestry'. Now it is obvious that *no one* can be asserted to be 'of pure normal ancestry'. If we trace back all the ancestors of any individual, we are practically certain, sooner or later, to come to an ancestor who was insane in the ordinary sense of the term, and it will hardly be denied that in the great majority of cases we do not require to go very far back to come to an ancestor who was 'alcoholic' or who had 'sick headaches' or 'neuralgia', to take some of the conditions on which stress is laid by Dr. Rosanoff and his collaborators. Yet we find it stated (p. 226) that 'the fact of duplex[1] inheritance was in every case based upon the absence of neuropathic manifestations in ancestors and collateral relatives, as far as known, as well as in the offspring; but inasmuch as in scarcely a case was the family history traced farther back than the third generation, it is clear that the possibility of simplex inheritance was in no case positively excluded'. We look with some interest at the actual pedigrees to see how many ancestors and how many collaterals are actually known; to

[1] A normal parent who is DD is said to be duplex.

our amazement we find that *not a single ancestor, not a single collateral* is given in the pedigrees. The authors include no statement about a single ancestor, nor about a single collateral of any of the 14 normal parents. Why, then, were they classified as 'of pure normal ancestry'? There can be little doubt, simply because they have no neuropathic offspring. There are in the pedigree a total of 68[1] cases where a neuropathic individual is married to a normal individual and has children whose mental condition is known. These 68 matings were divided into two classes, those which had at least one neuropathic child, and those in which all the children were normal. The first group are labelled b_1, and said to be the mating of DR and RR; the second are labelled c, and said to be a mating of DD and RR. The normal parents are then said to be 'of pure normal ancestry', and the conclusion is triumphantly drawn that such cases when mated with the neuropathic have no neuropathic offspring. The absence of neuropathic children is the sole reason for terming them 'of pure normal ancestry'.[2]

An illustration will make this clear.

Fig. (iv). Rosanoff and Orr, Chart XLIX, p. 252.



[1] The authors give the number as 70, but we can only trace 68.

[2] The fact that the authors have forgotten that, with the small families dealt with here, a by no means insignificant proportion of the matings of neuropathic and simplex will

In Generation I there are two matings of neuropathic and normal. Not a single ancestor nor collateral of the normal parent is known in either case. Yet the mating of I. 1 and 2 is said to be a mating of neuropathic and simplex, and that of I. 3 and 4 is said to be a mating of neuropathic with a 'normal of pure normal ancestry'. Had II. 3 been normal instead of neuropathic, it would have been asserted that I. 2 also was of 'pure normal ancestry'. It is a matter of regret that methods of this kind should find any place in a scientific journal. Dr. Davenport's responsibility in the matter will be dealt with later.

Little time need be spent on the remainder of the authors' conclusions. There are said to be seven matings of two simplex parents when the simplex condition was 'definitely ascertained'; there should be only three. The distinction between the d_1 matings and the e matings is precisely the same as that between the b_1 and the c matings. The d_1 group contains the cases where two normal parents have at least one neuropathic child; the e group contains those in which all the children are normal; in neither case has the gametic constitution been definitely determined. There is not a single pedigree given to show that conclusion 1.*f* (see p. 39) is true. It is unnecessary to follow the authors in their discussion of 'degrees of recessiveness' or of 'equivalent defects', but it may be noted that the last result, that 'about 30 per cent. of the general population, without being actually neuropathic, carry the neuropathic taint from their ancestors and are capable under certain conditions of transmitting the neuropathic make-up to their progeny' must also be rejected. Apart from any other blunders, the authors have forgotten that when a simplex individual mates with a neuropathic or another simplex, it by no means follows that at least one of the children will be neuropathic; in the latter case three-fourths of the families of one, nine-sixteenths of the families of two, &c., will have *only* normal offspring. Even an elementary knowledge of Mendelian theory would have been sufficient to enable the authors to avoid such an obvious pitfall.

7. Besides the memoirs just referred to dealing with feeble-mindedness and insanity in a considerable number of families, the American Eugenics Record Office has published two memoirs dealing with the history of individual degenerate stocks, and it appears of interest to ascertain whether effort concentrated on a single stock has

have *only* normal offspring need not again be insisted on, although it shows how slender is the authors' knowledge of the theory with which they profess to deal.

been more productive of permanent work than the collections of family histories just noted. We shall now consider the two memoirs entitled *The Hill Folk* and *The Nam Family*.

The Hill Folk. No. I of the *Eugenics Record Office Memoir Series*, 'The Hill Folk,' by Florence H. Danielson and Charles B. Davenport (August, 1912), gives 'the result of an investigation of two family trees in a small Massachusetts town. It aims to show how much crime, misery, and expense may result from the union of two defective individuals . . .'. Attention is chiefly directed to the inheritance of feeble-mindedness, and it is stated that 'a distinction has been made in the grades of feeble-mindedness, between high and low. The former term . . . refers to those persons who support themselves in a meager way, but who lack ambition, self-control, common sense, and the ordinary mental and moral capacity for differentiating right and wrong; the latter . . . refers to those who are not capable of self-support, and who are a special menace to the community from their lack of all mental and moral stamina'. We are also told that 'hard and fast lines are not drawn, but the symbols which most closely represent the character are placed on the chart and the description supplies more detailed information'.

An examination of the data given in this paper shows that the authors themselves attach no definite meaning to the terms they use; individuals described in exactly the same terms are given different symbols in the charts, and the same individual, when entered in duplicate, appears with different symbols. Thus the mating of A. III. 39 and C. III. 42 [1] is stated on p. 7 to be that of two feeble-minded persons. The husband A. III. 39 is said to be alcoholic and high grade feeble-minded in Chart A; alcoholic only in Chart C; 'a big, strong, labouring man but a drunkard' on p. 42; and 'alcoholic, shiftless' in Table III; while his wife is stated on p. 7 to be feeble-minded, in Charts A and C to be tubercular but not feeble-minded, on p. 42 to be 'a fairly normal woman who died of tuberculosis at twenty-nine years of age'; and in Table III to be 'tubercular, probably a high grade feeble-minded woman'.

In Table III the father of A. IV. 78 is said to be 'very alcoholic, shiftless, feeble-minded', but is merely entered in Chart A as alcoholic; on the other hand, the father of A. IV. 104, described a few lines farther down in Table III as 'feeble-minded, alcoholic, shiftless',

[1] The letters refer to the three charts, A, B, and C of the *Memoir*.

is marked fully in Chart A as low grade feeble-minded, alcoholic, and criminal.

In Table III, B. IV. 27 and B. IV. 28 (husband and wife) are both said to be high grade feeble-minded; in Chart B, the husband is said to be low grade feeble-minded and the wife high grade feeble-minded.

A large number of cases described as normal or 'up to grade' are entered in the charts as unknown, and on the other hand young children whose mental condition cannot have been determined are entered as feeble-minded or normal.[1] Thus, in Chart A the mental condition of A. V. 42 is said to be unknown, and in Table III she is described as normal; while B. V. 18, 19, 20, and 21, aged from one to eight years, are described as normal, and of B. IV. 91, 92, and 93, all entered as *feeble-minded*, it is stated that the oldest is five years old.

These classifications, often inaccurate and always vague, are used in an attempt to investigate the inheritance of feeble-mindedness on Mendelian lines. The authors have three grades in the scale of mental condition—low grade feeble-mindedness, high grade feeble-mindedness, and the normal condition; hence there are four possibilities according to what is done with the intermediate high grade feeble-minded. Thus:—

(*a*) As in Drs. Weeks and Davenport's paper on the 'Inheritance of Epilepsy',[2] it may be assumed that low grade feeble-mindedness is nulliplex (RR), that high grade feeble-mindedness is simplex (DR), and that normality is duplex (DD).

(*b*) Or, following the example of Dr. Raymond Pearl, in dealing with the inheritance of a character which also varies continuously, fecundity in the domestic fowl, one may divide the intermediate high grade feeble-minded between the normal and the low grade feeble-minded.

(*c*) Or, the high grade feeble-minded may be grouped with the low grade feeble-minded.

(*d*) Or, the high grade feeble-minded may be grouped with the normal.

The first two methods are ignored, but the results for the last two are given by the authors as follows:—

[1] The lowest ages for diagnosis of 'feeble-mindedness' in a child are 6 to 8, and even then it would be difficult to determine whether it was congenital or nutritional.

[2] *Eugenics Record Office Bulletin* No. 4.

Mating.	Percentages of Defectives.		
	Expected.	High and low grades together.	Low grade only.
1. DD × DD	0	0	0
2. DD × DR	0	0	2·7
3. DD × RR	0	37·5	14·3
4. DR × DR	25	33·2	30·7
5. DR × RR	50	53·6	33·7
6. RR × RR	100	77·3	52·6

Now it should be noted that the number of matings included in each group is not given nor are the numbers of offspring on which the percentages are based, and the actual matings are stated in only a few instances where it is necessary to explain away exceptional cases, and even these serve merely to show that either the description of the Hill folk, or the charts, or both, are inaccurate.[1] This is particularly unfortunate in groups 1, 2, and 3, involving the mating of duplex (DD) individuals, since the authors seem unaware that it is not possible to assert definitely that any individual is duplex. Thus, those three groups must be rejected. In the same way groups 4 and 5 should be confined to cases where those who are classed as simplex (DR) have each one nulliplex (RR) parent. The sixth group thus provides the crucial test, and it is unfortunate that the numbers given do not agree with those found for the charts. Thus the authors state that 52·6 per cent. of the children of two low grade feeble-minded parents are 'defective', but on examining the charts we find only 9 matings of this kind, showing 19 classified children, 7 low grade feeble-minded, 7 high grade feeble-minded, 1 alcoholic, 1 epileptic, and 3 normal. No combination of these groups gives 52·6 per cent. of defectives.

The authors' own figures, however, show that there is no approach to the theoretical Mendelian 100 per cent., and they therefore throw overboard the statement, repeated by Dr. Davenport and his collaborators in so many publications, that two feeble-minded parents have only feeble-minded children, and proceed to invent a new theory. They state (p. 11): 'The analysis of the data, then, gives statistical support to the conclusion abundantly justified from numerous other considerations, that feeble-mindedness is no elementary trait, but is a legal or sociological, rather than a biological term. Feeble-mindedness is due to the absence, now of one set of traits, now of quite a different

[1] See, for instance, the mating of A. III. 39, and C. III. 42 above.

set. Only when both parents lack one or more of the same traits do the children all lack the traits.'

No attempt is made, however, to give any evidence in support of this new theory, and for confirmation we must turn to the paper by Drs. Davenport and Weeks published less than a year before that under discussion.[1] On p. 17 of that paper we find the following:—

TABLE B.

Showing the Proportion of Tainted Individuals of any Class when both parents belong to that Class.

Father and mother in the class named below.	Number of classified offspring.	Proportion Normal.	Proportion with same trouble as parents.	Proportion with this trouble in the whole population of offspring.
Neurotic	27	48 per cent.	7 per cent.	15 per cent.
Migrainous	17	18 ,,	0 ,,	3 ,,
Alcoholic	7[2]	56[2] ,,	0 ,,	3 ,,
Paralytic	10	60 ,,	0 ,,	0 ,,

On the basis of this table it is stated on p. 17 that 'it is a remarkable and significant fact that when both parents have the same class of taint the proportion of offspring of that class is not exceptionally high (Table B)', and on p. 29 that 'the proportion of tainted offspring is not noticeably higher when both parents show the same nervous defect'. It is perhaps best to leave to Dr. Davenport the task of reconciling *Eugenics Record Office Bulletin* No. 4, and *Eugenics Record Office Memoir* No. 1. All we remark is that percentages based on such totals of offspring as 7 to 27 are wholly insufficient for the deduction of any scientific conclusion whatever. They have such large probable errors that they may directly lead to the statement of a sweeping dogma, and then to its irresponsible rejection within twelve months of its formulation by an equally sweeping but equally unproven doctrine.

8. The last publication to be considered here will be 'The Nam Family: A Study in Cacogenics'[3], by Drs. A. H. Estabrook and C. B. Davenport (*Eugenics Record Office Memoir* No. 2, August, 1912).

[1] *A Firs Study of Inheritance in Epilepsy. Eugenics Record Office Bulletin* No. 4, November, 1911.

[2] There are really 8 classified offspring, of whom 4 = 50 per cent. are normal.

[3] In a footnote the authors state: 'This term was first employed, so far as we know, by Dr. E. E. Southard, 1912.' If the point be of any importance, it may be noted that this term was used by Professor Karl Pearson in 'The Groundwork of Eugenics' (*Eugenics Laboratory Lecture Series, II*) in 1909.

According to the authors the memoir gives particulars regarding 1795 individuals, but the material is arranged in such a way as almost to defy analysis. It is not easy to understand why all the available information regarding the individuals who occur in this pedigree was not given in tabular form and in the order of the numbers given to them in the different generations. As at present arranged, it is difficult to discover where, if at all, information regarding any individual is provided. To take a definite case, V. 198 occurs at least four times in the description of the pedigree, and the reader who tries to locate these references will fully appreciate the absurdity of the arrangement.

On pp. 3–45 we are given a description of the members of the Nam family, and on pp. 45–64 a 'Summary of Characteristics' in which it is stated that 'an attempt has been made to bring together in compact form such characters of the Nams and allied families as are of social importance'. It is on this summary that the conclusions arrived at in the paper are presumably based. Some impression of the degree of accuracy attained in this paper may be obtained by comparing the entries in those two sections. It is not necessary to go over the whole of the 1795 individuals; the first page of the summary, dealing with 47 persons, may be taken as a sample of the whole. In dealing with education, the following symbols are used by the authors: Lt = literate, lt = illiterate, and in the description of the pedigree six cases are said to be illiterate, but only five are marked 'lt', the remaining case, V. 15, having no mark for education. Further, III. 2, who is said to be 'ignorant', is marked 'lt', but IV. 6, V. 6 c, V. 6 d, V. 11 and V. 12, who are also said to be 'ignorant', are given no mark for education, while IV. 2, who is 'ignorant' but 'can read and write', is marked 'Lt'. Again, the symbol 'l', used to denote 'incapable of learning at school', is applied to cases described as 'retarded in school-work', 'doing irregular and poor work in school', 'backward in school', &c. V. 2, described as 'indolent', is marked 'Sh' = shiftless, while V. 12 and V. 13, also described as 'indolent', are marked 'k' = not industrious. III. 2, described as 'lazy', is given the mark 'k', not industrious, while IV. 1 a, who is 'lazy', and V. 15, who is 'periodically industrious', have no mark for industry. VI. 6, described as 'bashful', is marked 'p' = unambitious. It is obvious that the authors have no clear idea of the meaning to be attached to their own terms, and that any statistical analysis of such categories must be idle.

Many individuals are entered in the 'Summary of Characteristics'

in duplicate, and this furnishes another test of the accuracy of the work. In analysing the authors' discussion of the 'Inheritableness' of alcoholism, we find that of 182 individuals whose relation to alcohol was stated, 44 appeared at least twice in the summary, and these may be taken as a sample of the whole. No fewer than 33 of these 44 appear in at least two different forms. Thus, V. 198 appears four times; he is said to be 'illiterate' on p. 49, 'literate' on p. 50, while two entries on p. 55 give no information about education at all; on p. 49 and p. 55 (twice) he is said to be dishonest, but not on p. 50; on p. 55 (twice) and p. 50 he is said to be 'quick', but not on p. 49.

In dealing with alcoholism, three symbols are defined: A = alcoholic, A_3 = sot, and a = not alcoholic; but in addition a fourth, A_4, is used without being defined at all, and among the 44 duplicates IV. 7 is entered twice as A and once as A_3; V. 201, once as A_4 and once as A; VI. 317 (three males), once as A_3 and once as A_4; VI. 128, as A and A?; and V. 96 and 97, once as alcoholic and once without any reference to alcoholism at all, while out of 1795 individuals *only* 12 are marked as 'not alcoholic'. No reliance whatsoever can be placed on any statement as to alcoholism made by these authors.

The authors, nevertheless, proceed to discuss the 'inheritableness' of four 'nonsocial traits': indolence, alcoholism, licentiousness, and 'forwardness vs. shyness'. No attempt is made to define any of these characters or to tell us where, for example, indolence ceases to carry its 'inhibitor' and industry begins. All are, from the standpoint of common sense, continuously varying characters. The methods by which the authors attempt to bring these characters into line with Mendelian theory are so extraordinary that they deserve attention.

(*a*) Indolence. The first difficulty met with in attempting to understand the authors' methods is that 'indolence' does not appear in the list of traits dealt with in the 'Summary of Characteristics', and we have already seen that the 'indolent' are sometimes entered as 'not industrious' and sometimes as 'shiftless', and those described as 'lazy' are sometimes marked 'not industrious' and sometimes given no mark at all in the 'Summary of Characteristics'; indeed, we find individuals who are marked 'shiftless' or 'not shiftless' without reference to their industry, and 'industrious' or 'not industrious' without reference to their shiftlessness; further, individuals may be 'shiftless' and 'not industrious', or 'industrious' and 'not shiftless'; and one, IV. 104, is said to be 'industrious' *and* 'shiftless'. Undismayed, however, the authors attempt to deal with 'indolence' as a Mendelian unit

character. No references are given as to the matings which are included in the various classes—a step which at least saves much criticism—and the results are said to be :—

Mating.	No. of Matings.	Known Children.	Industrious.	Indolent.
Industrious × Industrious	30	82	73	9
Indolent × Indolent	?	34	8	26
Indolent × Industrious	2	10	1	9

Naturally enough the authors admit that 'neither mating[1] behaves like pure absence of a character', but proceed thus: 'But we have two clear matings of industry and laziness where the lazy parent (mother) had two lazy parents; of 10 offspring, 9 were lazy and only 1 industrious like the father. This supports the hypothesis that laziness carries an inhibitor which is transmitted to the offspring. Consequently, two lazy parents may become the founders of industrious strains, but indolent strains arise chiefly, if not exclusively, by marriage with indolent persons. Such matings are eugenically unfortunate' (p. 67). Mendelism run mad is the only possible comment!

(*b*) Alcoholism. The authors' investigation into the inheritance of alcoholism shows the same hopeless confusion. The pedigree is said to contain 1795 individuals; on p. 65 it is also stated that 'alcoholism is extraordinarily high. Of the females 88 per cent. and of the males 90 per cent. are given to drinking in excess'. In dealing with the drink bill of this family the authors assume that there are 700 'alcoholics', but in the 'Summary of Characteristics' we find *only* 182[2] individuals regarding whom any information with respect to alcoholism is given, and of these 12 are marked 'not alcoholic'. According to the first statement, about 1600 drink to excess; according to the second, 700; and according to the third, even including the doubtful cases, only 170 are known to be alcoholic.

It is a little difficult to understand the principles on which the Nams have been classified in relation to alcoholism. Remembering that according to the authors, A = alcoholic, A_3 = sot, a = not alcoholic, while A_4 is undefined, we find that of the 182 who are classified, there are according to the 'Summary of Characteristics': 1, A_4; 4, A_3; 148, A; 5, A?; 1, 'formerly A'; 5, 'more or less A'; 1, in one place

[1] Industrious × Industrious, or Indolent × Indolent.

[2] We hope this is correct, but the authors' arrangement of their material renders accuracy a matter of the greatest difficulty.

A_4 and in another A; 3, A_3 and A_4; 1, A_3 and A; 1, A and A?; and 12, a. If we compare the description of the pedigree with the 'Summary of Characteristics' the results are even more extraordinary. Thus:—

V. 201, described as 'alcoholic, arrested often for drunkenness', is entered as A_4 on p. 49 and as A on p. 54.

IV. 21, described as 'having served two terms in jail for drunkenness', is entered as A_3.

VI. 138, described (p. 23) as 'alcoholic, served 15 days in jail for drunkenness', is entered as A_3.

IV. 7 (p. 6), who was 'in jail for 15 days because of alcoholism', is entered as A (twice).

IV. 7 (p. 18), described as 'alcoholic', is entered as A_3.

V. 38, described (p. 13) as 'mildly intemperate', is entered as A.

V. 256, described (p. 14) as 'mildly intemperate', is entered as A?.

Every encouragement ought to be given to field-workers to make their classifications as careful and accurate as possible, but the distinctions between the man who 'was in jail for 15 days because of alcoholism' and is marked A and the man who 'served 15 days in jail for drunkenness' and is marked A_3, or between the men who are described on consecutive pages in exactly the same terms as 'mildly intemperate' and yet are entered one as A and the other as A?, seem to be rather subtle.

No less remarkable is the authors' attempt to express the inheritance of alcoholism in terms of Mendelism. On p. 67 we find the following: 'Alcoholism. By this term is meant the condition of the steady, as opposed to the periodic or occasional drinker. Alcoholism is besottedness. In our families there are 9 matings of two alcoholic parents, giving rise to 21 children about whose relation to alcohol something is known. Every child, including 15 men and 6 women, becomes alcoholic.' It should be noted, in the first place, that if the authors were only dealing with 'besottedness', they might naturally be expected to deal with the class marked A_3 and defined as 'sots', but as only four individuals are marked definitely A_3,[1] this can hardly be the case.

If we examine the 'Summary of Characteristics', we find that there are sixteen matings where both parents are marked alcoholic (i.e. A_4, A_3 or A) and one mating of A × A?. Nine of these matings have no

[1] Four others are marked A_3 in one place and A_4 or A in another.

children or children who are too young for classification,[1] and the others show the following results:—

V. 41 × V. 40 (A ? × A). There are 5 children, but no information regarding alcoholism is given regarding any of them, although two are said to be 'socially satisfactory', which might be taken to imply that they are not alcoholic.

VI. 309 × VI. 132 (A_4 × A). According to the 'Summary' and one part of Chart A there are no children; according to another part of the pedigree there is one child, VII. 101, about whom no information is given.

IV. 16 × IV. 17 (A × A). The pedigree gives 10 children, the description of the pedigree only 8, and the 'Summary' also 8, 6 boys, all alcoholic and '2 girls married', but whether these are alcoholic or not is not stated.

IV. 21 × IV. 20 (A_3 × A). Of the two children one is said to be alcoholic, but no information is given about the alcoholism of the other, although the very full description of this woman states that she is married, industrious, illiterate, orderly, quick, an erotomaniac but now chaste, and neat.

IV. 36 × IV. 37 (A × A). There are 8 children, of whom 5 are marked alcoholic, no information being given about the alcoholism of the other three, although they are classified for other characters.

V. 89 and V. 112 (A × A). There are 9 children, of whom 7 survive; 6 sons are said to be alcoholic, but no information is given regarding the daughter.

VI. 133 × VI. 422 (A × A). According to Chart A there are 11 children, according to Chart C no children, according to the description on p. 22, 12 children, and according to the 'Summary', 11 children. On p. 22 it is stated that 'two boys are alcoholic, but on p. 54 only one is given as alcoholic.

V. 150 × V. 96 (A × A, but on p. 55 the father is not marked for alcoholism). According to p. 28 there are 6 children, Chart A gives 5 children, and the 'Summary' gives 4 children, two of whom are marked 'alcoholic' while the other two are not classified for alcoholism.

Assuming that there is really only one alcoholic child from the mating of VI. 133 and VI. 422, we get 21 alcoholic children from six matings, not nine. Whether these are the 21 'alcoholics' given by the authors, it is impossible to say in the absence of any state-

[1] Nevertheless the authors state that two children of three and six years respectively 'already show signs of the future', whatever that may mean.

ment as to which matings have been included in this group of cases. In any case the presence of so many individuals whose relation to alcoholism is undetermined although full information is given regarding many other characters, renders any investigation of the inheritance of alcoholism on the basis of such data purely idle.

There are, however, other reasons for refusing to accept this result. This study of the Nam family by Drs. Estabrook and Davenport was published in August, 1912, as *Memoir No. 2 of the Eugenics Record Office*, and exactly the same point was dealt with by Drs. Davenport and Weeks in *Eugenics Record Office Bulletin* No. 4, published in November, 1911. In this publication is a Table B, p. 17, which shows 'the proportion of tainted individuals of any class when both parents belong to that class'. One of the classes dealt with is that of the 'alcoholic', and the authors state that of seven classified offspring[1] of two alcoholic parents, *not one* is alcoholic—and we are told that 'it is a remarkable and significant fact that when both parents have the same class of taint the proportion of offspring of that class is not exceptionally high (Table B)'. Further, Dr. Weeks in his paper read before the Eugenics Congress in July, 1912, gives 8 matings where both parents are alcoholic,[2] and of 29 classified offspring only 4 are said to be alcoholic.

Thus in November, 1911, Drs. Davenport and Weeks say that *none* of the children of two alcoholic parents is alcoholic; in July, 1912, Dr. Weeks says that *some* are alcoholic, and in August, 1912, Drs. Estabrook and Davenport say that *all* are alcoholic. All these results are, however, in some unexplained fashion, in agreement with Mendelian rules. Mendelism according to Dr. Davenport is indeed a wonderful theory. In dealing with mental defect, however, Dr. Davenport's opinions changed just as rapidly in the opposite direction. Thus in November, 1911, Drs. Davenport and Weeks state that 'when both parents are either epileptic or feeble-minded, all their offspring are so likewise'[3]; in *Heredity and Eugenics* published June, 1912, Dr. Davenport tells us on p. 281 that 'when both parents are feeble-minded all of the

[1] According to Table V, however, there are 8, not 7, classified offspring, none being alcoholic.

[2] *Problems in Eugenics*, Table V, pp. 86 and 87 (Eugenics Education Society). Dr. Weeks states in Table IX, p. 94, that there are only 7 such matings, but gives 8 in Table V.

[3] *Eugenics Record Office Bulletin* No 4, p. 29. In Table I of the same publication, however, the authors give a case (No. 4062 b) where a feeble-minded man and an epileptic woman have two *normal* children. They state (*Ibid.*, p. 4) that the rule that two feeble-minded parents have only offspring like themselves was first noted by one of them in 1909.

children will be so likewise; this conclusion has been tested again and again', and on p. 286 of the same volume that 'two affected parents have exclusively *normal*[1] children'; while in August, 1912, Miss Danielson and Dr. Davenport tell us that 'the analysis of the data then gives statistical support to the conclusion abundantly justified from numerous other considerations, that feeble-mindedness is no elementary trait, but is a legal or sociological, rather than a biological term. Feeble-mindedness is due to the absence, now of one set of traits, now of quite a different sort. Only when both parents lack one or more of the same traits do the children lack all the traits.'[2] In November, 1911, 'it is a remarkable significant fact that when both parents have the same class of taint the proportion of offspring of that class is not exceptionally high';[3] and in August, 1912, the conclusion that only when the parents have the same class of taint, all the children have the same taint, is abundantly justified.

Mendel defectiveness seems for these American investigators to be a far more serious problem than *mental* defectiveness!

One other example of the authors' discussion of the inheritance of alcoholism may be given. In the 'Nam Family', p. 67, they say: 'When, on the other hand, both parents are temperate, in 16 matings, producing 45 children about whose relation to alcohol something is known, only 37 are temperate, or 82 per cent. If we divide the fraternities into two lots: (*a*) those that contain no alcoholics and (*b*) those that actually contain alcoholics as well as non-alcoholics, then in Lot *b* there are 63 per cent. non-alcoholic. If we should include also those families (unknown) which though potentially capable of producing one in four children alcoholic actually, but because of the small size of the family (2 or 3) produce none, we should increase the proportion of non-alcoholics towards the 75 per cent. which is to be expected on the assumption that alcoholism is due to a defect, a lack of control, perhaps of appetite.'

This assumes in the first place that the alcoholics are RR and every temperate person a DR, although in the previous year Dr. Davenport had assumed that alcoholism was an intermediate form of mental defect and classed it as DR. Further, the authors have forgotten that since Lot *b* includes only those families 'that actually contain alcoholics

[1] The italics are ours. Dr. Davenport probably intended to write *affected*. The statement applies to *any* recessive character.

[2] 'The Hill Folk;' *Eugenics Record Office Memoir* No. 1, p. 11.

[3] *Eugenics Record Office Bulletin* No. 4, p. 17.

as well as non-alcoholics', there must also be added those families (unknown) which though potentially capable of producing one in four children alcoholic actually, because of the small size of the family (2 or 3) produce *only* alcoholics, which would *reduce* the percentage of non-alcoholics. A more straightforward and equally valid method of obtaining the desired result would be to subtract 3 individuals from the 37 temperate, leaving 34, or 75·6 per cent., which 'approaches closely' to the expected 75 per cent. The additional fact that the 'Summary of Characteristics' gives only *twelve* individuals who are marked as 'not alcoholic' should also be noted!

Finally, on p. 68 the authors state that 'there is here a marked preponderance of imbecility and epilepsy in the offspring of two feeble-minded parents'. 'Feeble-minded' is obviously a slip for 'alcoholic', but even after making this correction the statement can hardly be accepted since the percentages of imbecile and epileptic children are, when both parents are alcoholic, 38, when one parent only is alcoholic, 14, and when neither parent is alcoholic, 20. So that it would seem to be better to have one parent alcoholic than both temperate!

(*c*) Licentiousness. No attempt is made to define either licentiousness or chastity. We are told that 'it is clear to the careful observer that the marriage relation does not receive the recognition in Nam Hollow which society places upon it elsewhere. Nevertheless, the ideals of marriage and chastity are universal throughout this region, only their importance is insufficiently recognized, largely because the mentality of the people is not capable of appreciating their importance' (p. 68), but this may mean anything. As usual an attempt is made to show that licentiousness and chastity are Mendelian characters, but we are not even told which is to be considered the dominant character; the authors find that some of the children of chaste parents are licentious, but explain in the one case where any information is given that the licentious man is 'essentially chaste',[1] and similarly when they find that licentious parents have chaste children explain that here they see 'the clear effect of a good training inculcating a lesson of sex control'; thus it is really immaterial which we regard as dominant. The authors' words deserve to be given in full. 'First, if both parents are chaste practically all the children are chaste. The most striking exception is the case of IV. 55 × IV. 54[2] mating (fig. 2). IV. 55 was an industrious, surly, but chaste man, and his wife is believed

[1] Unfortunately the evidence that this man is 'essentially chaste' is not given.

[2] Two lines lower down in Fig. 2 the mother is given the number III. 54, not IV. 54.

to have been equally chaste. All of their eight children were chaste except V. 143, who is active and industrious, was the father of an illegitimate child in his youth, but married later and has been a chaste and faithful husband. *Here, probably, a nearly universal practice among the young men of the neighbourhood has led an essentially chaste man for a short time into irregular practices.*' [1] . . .

'Second, if both the father and the mother are licentious, the condition of the progeny is in striking contrast to the foregoing. Of 48 persons whose sex relations are known, only 6 are chaste, or 12 per cent.' The authors go on to describe one of these families thus: 'All the children who have matured have proved to be licentious except VI. 33. This girl was, when young, adopted and reared by a good family; she could not advance in school, and when she returns to her old home she reverts to lazy slovenly ways, but she is chaste and now married. Here we seem to see the clear effect of a good training inculcating a lesson of sex control which tided the girl over until she married. But her essential traits seem to have undergone little change by the good bringing up.'

We are told, however, that 'the ideals of marriage and chastity are universal throughout this region'; how much simpler it would have been to state that: *Here, probably, a nearly universal practice among the young women of the neighbourhood had led an essentially unchaste woman for a short time into regular practices.*

(*d*) Forwardness vs. Shyness. No criticism of the authors' discussion of the inheritance of 'Forwardness vs. Shyness' can be more effective than the citation of their own words (p. 71): 'An ability to meet people on equal terms and to mix with them is a normal trait of man. We may call it forwardness, and the lack of the trait shyness or aloofness. Shyness is frequently found among people that live in out of the way places, and there is a tendency to ascribe it solely to training or lack of experience in meeting people; but there are several objections to this view. First, this shyness is not striking in all isolated communities, but only in certain ones, and these are usually highly inbred communities in which this one trait has become widely disseminated. Second, even in cities and in active communities the extremes of shyness or diffidence, as well as of forwardness are encountered. Third, in Nam's Hollow, in identical environment, very forward and very shy people, even children,[2] are met with. In one branch of the Nams the absence of

[1] The italics are ours.

[2] Three children, 'now six, five and three years old respectively, are shy and slow.'

forwardness is striking and has been made a special object of study (Fig. 4).'

On examining Fig. 4, we find considerable difficulty in understanding what significance the authors really attach to the terms they use; thus V. 166, who is marked 'shy' in Fig. 4, is said, on p. 30, to be 'a temperate, sociable, and licentious man', and it is not quite clear how a man who is unable 'to meet people on equal terms and to mix with them' can be described as 'sociable'. It would be difficult to find any character less suitable for analysis on Mendelian lines. There are of course the usual crop of blunders; Fig. 4 does not agree with Chart A, nor with the general description of the Nam family, nor with the 'Summary of Characteristics'. Thus Fig. 4 gives 7 children of V. 152 and 84, all shy; the 'Summary', on p. 57, gives 7 children of whom 5 are said to be reticent and shy, while no information regarding reticence or shyness is given about the other two; on p. 29 it is stated that there were eleven children, of whom seven survived, 'all but one, VI. 231, reticent and shy.' Similarly of the three children of VI. 124 and 173, one is shy and two not shy according to Fig. 4; on p. 20 it is stated that of the four children, one died at six months and the others, now six, five, and three respectively, are shy and slow.

Further, 'the consequences of the different matings' are tabulated on p. 71, and the figures given differ from those which are shown in Fig. 4 as follows:—

	Known offsprings are:			
	According to page 71.		According to Fig. 4.	
	Forward.	Shy.	Forward.	Shy.
Both parents known to be forward	5	1	5	2
One parent forward, the other shy	18	14	20[1]	14
Both parents shy	0	14	0	10

'This table supports our hypothesis that there is a factor for forwardness and that shyness is due to its absence. Consequently, if both parents be shy, all offspring will be shy.' But we have just seen that of the seven children of V. 152 and 84, marked shy on Fig. 4, at least one is *not* shy. Here, as is not unusual with Dr. Davenport, his conclusions can be refuted from his own data. But measure the courage of the man of science who would base the demonstration for any

[1] In addition there is here one man (VI. 121) who is said to be dead, aged 26. It is not certain whether he should be classified as 'forward' or as 'unknown'.

theory of heredity on the numbers contained in such a table as this!

The rest of this paper can only receive brief notice. The traits selected for tabulation and discussion are all characters which practically vary continuously and present an infinite number of grades. They are essentially unfitted for analysis *upon Mendelian lines*. Apart from this, however, some of them are hardly worthy of serious discussion; it is difficult to see that any useful purpose is likely to be served by classifying, generally on hearsay evidence alone, the members of this family as 'garrulous' or 'taciturn', 'quick' or 'slow', 'possessing causality or appreciation of the relation of things' or 'lacking causality', and the authors have made it quite clear that they themselves have failed to attach any definite meaning to the terms they use.

Further, some of the phrases used in the description of the Nams show that the authors cannot be acquitted of bias in their classifications; we are told, for instance, that a 'licentious' man is 'essentially chaste', of a boy of thirteen that 'his sex instincts have not yet broken into flame', of a girl of eleven that 'her sex-impulses are still dormant', of two children of six and three that 'already they show signs of the future—reticence, taciturnity, the mouth held open without adenoids'; and one can only marvel at the classification of a three-year old boy as 'cross, stubborn, and shy', or a four-year old boy as 'irritable'. Was he cutting teeth?

Nor can any weight be attached to the authors' estimate of the cost to the State of the Nam family. Apart from the faulty method of accounting by which *nothing* is entered to the credit of the Nams, hardly a single item can be accepted as having any relation to the facts. Perhaps the most curious is one which runs: 'Murders at $1200 . . . $2400!' In *Memoir No.* 1 *of the Eugenics Record Office*, in a similar calculation, there appears an entry: 'Value (of life sacrificed by murder), $1700.' If these two items refer to the same thing, there would seem to have been a slump in murders!

What conclusions do the authors draw from this extraordinary study? Section 24 is headed 'Social Prophylaxis', and the following extracts may be given:—

'Although our primary aim is to present the bare facts we cannot altogether neglect the natural inquiry as to the proper treatment of such a condition as we have described.

'First, there is the method of *laissez faire*. . . .

'Second, there is the method of improving the conditions of the persons in the Hollow. . . . It might be that the improvement of the dress and costumes of the people would make it possible for them to secure a better grade of mates and thus to produce a stronger progeny. . . .

'Third, the people might be scattered in the expectation that they would then out marry and marry better.[1] . . .

'Fourth, the most radical measure, the surest—though perhaps the most expensive, would be to take the children and youth whose family history yields little hope that they will be the parents of socially desirable stock and place them, throughout the reproductive period, in one of the State villages for the non-social. . . .'

It is fortunate that the more solid doctrines of Eugenics do *not* wholly depend on evidence of the kind that Dr. Davenport brings forward.

9. It is, we think, impossible in any of these American publications to be in the least certain of what are the characteristics actually classified. Because of the impossibility of actually ascertaining in the bulk of cases which parents are simplex (DR) and which duplex (DD), we gravely doubt whether it is worth considering any cases but the matings of nulliplex with nulliplex, i. e. (RR) × (RR). These cases are numerically few in number and yet every series, on the basis of the authors' own evidence, shows exceptions to the Mendelian rule of the sole occurrence of defective offspring. These exceptions are amply confirmed by material in the possession of the Galton Laboratory, but apart from this every exception obtained in this case is of special note, because the *Trait Book* and other publications of the American Record Office hold no suspended judgement, the worker is *a priori* warned of what he is to expect by the actual labelling of certain characters as recessive and dominant. We place here together, then, some of the exceptions to Mendelian laws we have noted in the previous pages. It is somewhat unfortunate that in all these publications dealing with the inheritance of mental defect, Dr. Davenport and his collaborators are obliged to exercise a considerable amount of ingenuity in getting rid of the rather frequent exceptions to the rules they so confidently lay down. The following list gives some of the more striking :—

(*a*) The simplest method is, of course, to omit them without a word of explanation. Table I of *Bulletin* No. 4, by Drs. Davenport and Weeks, contains a mating of a feeble-minded father and an epileptic

[1] The second and third conclusions seem only another form of Dr. Davenport's cacogenic dictum : 'Let weakness marry strength.' The third is rejected, but not the second.

mother (Case 4062 b); they have two *normal* children. According to the authors' theory, *all* should be defective. This mating is entirely dropped in discussing Table I, and even disappears entirely from Table I of Dr. Weeks's paper read before the Eugenics Congress.

(*b*) In Dr. Weeks's Eugenics Congress paper (Table I, Case 4539), 2 epileptic parents have among their children 2 who had migraine and 6 who were neurotic; all should be defective (epileptic or feeble-minded). The parents are then said to have 'developed epilepsy late in life', although the age of incidence of epilepsy is not given in this nor in any other case in the paper.

(*c*) In the same paper, Table I (Cases 3387 and 1745 a) two pairs of feeble-minded parents have each one child, both of whom are said in the text (p. 68) to be drunkards and in Table I to be neurotic. They ought to be defective (epileptic or feeble-minded), and so it is stated that they 'may or may not have been feeble-minded'.

(*d*) In the same paper in Table I a there are 8 tainted and 7 'seemingly normal' children who ought to have been defective (epileptic or feeble-minded). It is stated that the normal children 'came from two fraternities, where in one case the father's insanity seemed to be traumatic and in the other alcoholic'. Dr. Weeks has forgotten here that some explanation must also be given of the presence of the 8 'tainted' offspring who ought to have been defective. They involve three additional fraternities.

(*e*) In *Bulletin* No. 5, Dr. Rosanoff and Miss Orr find 10 exceptions to their rule that two neuropathic parents have only neuropathic children. In two cases (aged 38 and 29) it is stated that 'the neuropathic constitution is not definitely excluded', and in the other eight (aged from 8 to 22) that they 'have not reached the age of incidence', The 'neuropathic condition' ranges from death from convulsions in infancy to senile deterioration, so that it is unfortunate that the authors do not tell us what the 'age of incidence' is; according to the authors it seems to be between 22 and 29, but this hardly agrees with their classification of infantile convulsions as 'neuropathic'.

(*f*) Perhaps the most comprehensive method of meeting an exception is that given by Dr. Goddard in *The Kallikak Family*.[1] Finding two exceptions to the 'law that two feeble-minded parents do not have anything but feeble-minded children', he says: 'We may account for these two exceptions in one of several ways. Either there is a mistake in calling them normal, or a mistake in calling the parents feeble-

[1] The Macmillan Company, 1912, p. 114.

minded; or else there was illegitimacy somewhere and these two children did not have the same father as the others of the family. Or we may turn to the Mendelian law and we discover that according to that law there might be in rare cases such a combination of circumstances that a normal child might be born from two parents that function as feeble-minded.' Thus the facts are to be considered as elastic, and if that fails we are to make the theory plastic enough to cover the facts.

(g) Unfortunately Dr. Davenport's latest discovery has rendered all these explanations useless. After telling us in *Heredity and Eugenics*, p. 281, that 'when both parents are feeble-minded all of the children are so likewise; *this conclusion has been tested again and again*,[1] in *The Hill Folk*, p. 11, he says: 'The analysis of the data, then, give support to the conclusion *abundantly justified from numerous other considerations*[1] that feeble-mindedness is no elementary trait, but is a legal or sociological rather than a biological term. Feeble-mindedness is due to the absence, now of one set of traits, now of quite a different set. Only when both parents lack one or more of the same traits do the children all lack the traits.' These two publications appeared *within three months of each other*. Dr. Davenport was certainly unfortunate in June, 1912, when testing his first theory 'again and again' in being quite unaware that in August, 1912, it would be 'abundantly justified from numerous other considerations' that this first theory was untenable.

10. We believe that those who dispassionately consider the papers discussed in this criticism must conclude with the present writer that the material has been collected in an unsatisfactory manner, that the data have been tabled in a most slipshod fashion, and that the Mendelian conclusions drawn have no justification whatever. The authors have in our opinion done a disservice to knowledge, struck a blow at careful Mendelian research, and committed a serious offence against the infant science of Eugenics. Every piece of unthorough work 'dominates' in research, for it begets its likes; others find it equally easy to reach similar spectacular conclusions by loose methods applied to inadequate data. They await the same chorus of praise from an uninstructed press, and from those whose passion it is to tickle the taste of the moment. Why, we shall be again asked, does the Galton Laboratory waste its energies on destructive criticism? We shall be told, no doubt, that it is idle jealousy of the work of

[1] The italics are ours.

another Laboratory. We are familiar indeed with this attitude of mind; the deprecation of well-meaning men, who do not see the gravity of the present situation—the impending danger that the new science of Eugenics will be strangled at its birth—as was the case of that once promising infant 'social science'. The public have common sense, and when they see such statements as those propounded in some of these recent American papers, followed by such advice as Dr. Davenport's: 'Let weakness in any trait marry strength in that trait, and strength marry weakness,' they will apply the test of experience to such doctrine, and end by condemning wholly a science which proclaims such absurdities. Shall the stocks tainted with tuberculosis, with insanity, with epilepsy, with every defect and deformity of hereditary nature be directly encouraged to taint socially valuable stocks healthy in mind and body, and the latter be directly told to marry weakness? When we find such teaching—based on the flimsiest of theories and on the most superficial of inquiries—proclaimed in the name of Eugenics, and spoken of as 'entirely splendid work', we feel that it is not possible to use criticism too harsh, nor words too strong in repudiation of advice, which, if accepted, must mean the death of eugenics as a science. We are confident that Dr. Davenport's advice would have been as heartily repudiated by the founder of Eugenics as it is by all members of the Laboratory that bears his name. The future of the race depends on the strong mating with the strong, and on the weak refraining from every form of parenthood. Nothing short of this rule will satisfy the true Eugenist.

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